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United States
Department of
Agriculture

Science and
Education

1984 Budget

Explanatory Notes

Science and Education Agencies

STA/STA

Agricultural Research Service
Cooperative States Research Service
Extension Service
National Agricultural Library

PRODUCTION SECTION
GENERAL RECORDS

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AGRICULTURAL RESEARCH SERVICE

Purpose Statement

Agricultural Research Service was established on November 2, 1953, pursuant to authority vested in the Secretary of Agriculture by 5 U.S.C. 301 and Reorganization Plan No. 2 of 1953, and other authorities.

The research performed by Agricultural Research Service (ARS) is authorized by the Department of Agriculture Organic Act of 1862 (5 U.S.C. 511), the Research and Marketing Act of 1946, as amended (7 U.S.C. 427,1621), the National Agricultural Research, Extension, and Teaching Policy Act of 1977 (7 U.S.C. 3101, 3222) and the Agriculture and Food Act of 1981 (7 U.S.C. 1281).

Agricultural Research Service is responsible for conducting basic, applied and developmental research on:

- Animal production
- Plant production
- Use and improvement of soil, water, and air
- Processing, storage, distribution, food safety, and consumer services
- Human nutrition research

The research applies to a wide range of goals; commodities; natural resources; fields of science; and geographic, climatic, and environmental conditions. It is categorized into 66 ARS National Research Programs and six Special Research Programs.

As the U.S. Department of Agriculture's in-house agricultural research agency, ARS has major responsibilities for conducting and leading the national agricultural research effort. ARS provides initiative and leadership in five areas:

- * Research on broad regional and national problems.
- * Research to support Federal action and regulatory agencies.
- * Expertise to meet national emergencies.
- * Research support for international programs.
- * Scientific resource to the Executive Branch and Congress.

The mission of ARS research is to develop new knowledge and technology which will insure an abundance of high quality agricultural commodities and products at reasonable prices to meet the increasing needs of an expanding economy and to provide for the continued improvement in the standard of living of all Americans. This mission focuses on the development of technical information and technical products which bear directly on the needs to (1) manage and use the Nation's soil, water, air, and climatic resources, and improve the Nation's environment; (2) provide an adequate supply of agricultural products by practices that will maintain a permanent and effective agriculture; (3) improve the nutrition and well-being of the American people; (4) improve living in rural America; and (5) strengthen the Nation's balance of payments.

Research is conducted at numerous field locations in the States, District of Columbia, Puerto Rico, the Virgin Islands, and in several foreign countries. Much of the work is conducted in direct cooperation with the State agricultural experiment stations, other State and Federal agencies, and private organizations.

Central offices of ARS are in the Washington, D.C. Metropolitan Area. The field activities are managed on a geographical basis through four Regional Offices, 13 Area Offices, eight major Research Centers, and five Human Nutrition Centers. Research activities are carried out at 145 separate field locations. As of September 30, 1982, there were 7,602 full-time employees and 1,050 other than full-time employees. Of the total, 191 full-time employees and 22 other than full-time employees worked in the headquarters office.

AGRICULTURAL RESEARCH SERVICE

Available Funds and Staff-Years

Actual 1982, and Estimated 1983 and 1984

Item	Actual 1982		Estimated 1983		Estimated 1984	
	Amount	Staff-Years	Amount	Staff-Years	Amount	Staff-Years
Direct Appropriation:						
Agricultural Research Service.....	\$422,239,000:	8,329:	460,222,000:	8,342:	472,410,000:	8,342:
Buildings and Facilities.....	8,596,000:	- -:	1,927,000:	- -:	- -:	- -:
Total, Direct Appropriation.....	430,835,000:	8,329:	462,149,000:	8,342:	472,410,000:	8,342:
Deduct Allotments to Other Agencies:						
Forest Service.....	-347,000:	-1:	-393,000:	-1:	-394,000:	-1:
Net.....	430,488,000:	8,328:	461,756,000:	8,341:	472,016,000:	8,341:
Obligations from Other USDA Appropriations:						
Animal and Plant Health Inspection Service.....	3,347,372:	78:	3,519,000:	78:	3,519,000:	78:
Food Safety Inspection Service.....	1,460,891:	- -:	1,510,000:	- -:	1,510,000:	- -:
Federal Grain Inspection Service.....	253,080:	- -:	253,000:	- -:	253,000:	- -:
Economic Research Service.....	250,949:	3:	250,000:	3:	250,000:	3:
Agricultural Marketing Service.....	249,048:	- -:	249,000:	- -:	249,000:	- -:
Miscellaneous Reimbursements.....	2,166,978:	24:	4,691,000:	24:	4,691,000:	24:
Total, Other USDA Funds.....	7,728,318:	105:	10,472,000:	105:	10,472,000:	105:
Total, Agriculture Appropriations.....	438,216,318:	8,433:	472,228,000:	8,446:	482,488,000:	8,446:
Other Federal Funds:						
Department of Defense.....	1,009,796:	10:	1,000,000:	10:	1,000,000:	10:
Department of Health and Human Services.....	1,111,420:	7:	1,100,000:	7:	1,100,000:	7:
Department of Energy.....	2,236,615:	5:	2,511,000:	5:	2,511,000:	5:
Environmental Protection Agency.....	1,160,372:	3:	1,390,000:	3:	1,390,000:	3:
Department of Interior.....	610,496:	8:	610,000:	8:	610,000:	8:
Miscellaneous Reimbursements.....	1,031,169:	14:	4,245,500:	14:	4,245,500:	14:
Total, Other Federal Funds.....	7,159,868:	47:	10,856,500:	47:	10,856,500:	47:
Non-Federal Funds:						
State of California.....	216,725:	- -:	215,000:	- -:	215,000:	- -:
Maryland.....	28,210:	- -:	50,000:	- -:	50,000:	- -:
Oklahoma.....	42,276:	- -:	42,000:	- -:	42,000:	- -:
Pennsylvania.....	25,168:	- -:	25,000:	- -:	25,000:	- -:
Cotton, Incorporated.....	35,313:	- -:	15,000:	- -:	15,000:	- -:
Miscellaneous Reimbursements.....	157,315:	- -:	324,500:	- -:	324,500:	- -:
Miscellaneous Contributed Funds.....	1,614,250:	17:	2,000,000:	17:	2,000,000:	17:
Total, Non-Federal Funds.....	2,119,257:	17:	2,671,500:	17:	2,671,500:	17:
Total, Agricultural Research Service....	447,495,443:	8,497:	485,756,000:	8,510:	496,016,000:	8,510:

Full-Time Equivalent
Staff-Years:

	<u>1982 Actual</u>	<u>1983 Estimated</u>	<u>1984 Estimated</u>
Ceiling.....	8,437	8,450	8,450
Non-Ceiling.....	<u>60</u>	<u>60</u>	<u>60</u>
Total.....	8,497 =====	8,510 =====	8,510 =====

Permanent Positions by Staff-Year Summary

Grade	1982 Actual			1983 Estimate			1984 Estimate		
	Headquarters	Field	Total	Headquarters	Field	Total	Headquarters	Field	Total
ES-6	2	--	2	2	--	2	2	--	2
ES-5	4	5	9	4	5	9	4	5	9
ES-4	6	21	27	6	21	27	6	21	27
ES-3	4	--	4	4	--	4	4	--	4
ES-2	--	4	4	--	4	4	--	4	4
ES-1	5	7	12	5	7	12	5	7	12
GS-17	1	2	3	1	2	3	1	2	3
GS-16	6	3	9	6	3	9	6	3	9
GS/GM-15	51	315	366	51	305	356	48	308	356
GS/GM-14	41	608	649	41	593	634	39	595	634
GS/GM-13	81	886	967	81	866	947	77	870	947
GS-12	79	790	869	79	760	839	75	764	839
GS-11	37	637	674	37	622	659	35	624	659
GS-10	1	14	15	1	14	15	1	14	15
GS-9	26	739	765	26	724	750	25	725	750
GS-8	7	181	188	7	181	188	7	181	188
GS-7	68	776	844	68	759	827	65	762	827
GS-6	115	340	455	111	344	455	106	349	455
GS-5	79	808	887	79	788	867	75	792	867
GS-4	65	528	593	65	508	573	62	511	573
GS-3	23	187	210	23	177	200	22	178	200
GS-2	--	61	61	--	61	61	--	61	61

Positions at rates :
Established by
Act June 20, 1958
(U.S.C. 3104).....

Permanent Positions by Staff-Year Summary

1982 Actual, 1983 Estimate and 1984 Estimate

Grade	1982 Actual			1983 Estimate			1984 Estimate		
	Headquarters	Field	Total	Headquarters	Field	Total	Headquarters	Field	Total
Grade Established under Foreign National Pay Plan:	--	24	24	--	31	31	--	31	31
Ungraded Positions:	19	1,042	1,061	19	1,018	1,037	19	1,018	1,037
Total Permanent Positions.....	721	7,988	8,709	717	7,803	8,520	685	7,835	8,520
Staff-Years:									
Ceiling.....	722	7,715	8,437	700	7,750	8,450	679	7,771	8,450
Non-Ceiling.....	1	59	60	1	59	60	1	59	60
Total.....	723	7,774	8,497	701	7,809	8,510	680	7,830	8,510
=====									

AGRICULTURAL RESEARCH SERVICE

CLASSIFICATION BY OBJECTS

1982 and Estimated 1983 and 1984

	<u>1982 Actual</u>	<u>1983 Estimated</u>	<u>1984 Estimated</u>
Personnel Compensation:			
Headquarters.....	\$ 19,439	\$ 19,245	\$ 18,467
Field.....	<u>200,988</u>	<u>213,719</u>	<u>217,221</u>
11 Total Personnel Compensation.....	220,427	232,964	235,688
12.0 Personnel Benefits.....	23,521	26,454	27,382
Total Pers. Comp. & Benefits...	<u>243,948</u>	<u>259,418</u>	<u>263,070</u>
Other Objects:			
21.0 Travel and transportation of persons.....	4,388	4,676	5,094
22.0 Transportation of things....	1,037	1,184	1,235
23.2 Communications, utilities and other rent.....	26,477	30,188	31,010
24.0 Printing and reproduction...	1,145	1,306	1,350
25.0 Other services.....	72,586	90,757	92,112
26.0 Supplies and materials.....	37,792	43,094	44,012
31.0 Equipment.....	22,881	24,504	23,510
32.0 Lands and structures.....	19,989	15,124	9,919
41.0 Grants, subsidies, and contributions.....	<u>935</u>	<u>1,098</u>	<u>1,098</u>
Total other objects.....	<u>187,230</u>	<u>211,931</u>	<u>209,340</u>
Total obligations.....	<u>431,178</u>	<u>471,349</u>	<u>472,410</u>
Position Data:			
Average Salary, ES positions	\$ 58,500	\$ 62,898	\$ 64,123
Average Salary, GS positions	\$ 28,388	\$ 29,899	\$ 30,218
Average Grade, GS positions	9.25	9.25	9.25
Average Salary of Ungraded positions.....	\$ 20,353	\$ 21,379	\$ 21,593

AGRICULTURAL RESEARCH SERVICE

The estimates include proposed changes in the Language of this item as follows: (new language underscored; deleted matter enclosed in brackets).

Agricultural Research Service

- For necessary expenses to enable the Agricultural Research Service to perform agricultural research and demonstration relating to production, utilization, marketing, and distribution (not otherwise provided for), home economics or nutrition and consumer use, and to coordinate and provide program leadership for higher education work of the Department, and for acquisition of lands by donation, exchange, or purchase at a nominal cost not to exceed \$100, [~~\$452,378,000~~] \$470,410,000; Provided, That appropriations hereunder shall be available for field employment pursuant to the second sentence of section 706(a) of the Organic Act of 1944 (7 U.S.C. 2225), and not to exceed \$115,000 shall be available for employment under 5 U.S.C. 3109: Provided further, That funds appropriated herein can be used to provide financial assistance to the organizers of international conferences, if such conferences are in support of agency programs: Provided further, That appropriations hereunder shall be available for the operation and maintenance of aircraft and the purchase of not to exceed one for replacement only: Provided further, That of the appropriations hereunder not less than \$10,526,600 shall be available to conduct marketing research: Provided further, That appropriations hereunder shall be available pursuant to 7 U.S.C. 2250 for the construction, alteration, and repair of buildings and improvements, but unless otherwise provided the cost of constructing any one building shall not exceed [~~\$110,000~~] \$127,000, except for headhouses connecting greenhouses which shall each be limited to \$500,000, and except for ten buildings to be constructed or improved at a cost not to exceed [~~\$200,000~~] \$245,000 each, and the cost of altering any one building during the fiscal year shall not exceed 10 per centum of the current replacement value of the building or [~~\$110,000~~] \$127,000, whichever is greater: Provided further, That the limitations on alterations contained in this Act shall not apply to a total of [~~\$110,000~~] \$200,000, for facilities at Beltsville, Maryland: Provided further, That the foregoing limitations shall not apply to replacement of buildings needed to carry out the Act of April 24, 1948 (21 U.S.C 113a): Provided further, That the foregoing limitations shall not apply to the construction of a Fruit and Nut Germplasm Clonal Repository at Geneva, New York.
- Special fund: To provide for additional labor, subprofessional, and junior scientific help to be employed under contracts and cooperative agreements to strengthen the work at Federal research installations in the field, \$2,000,000.

Explanation of Changes

The first change provides language authorizing ARS to conduct higher education activity. This is necessitated by an administrative reorganization resulting in transfer of responsibility for higher education to ARS.

The second change would increase the cost limitation on (1) construction of any one building (except headhouses connecting greenhouses) from \$110,000 to \$127,000; (2) construction of ten buildings from \$200,000 to \$245,000 each; and (3) altering any one building during the fiscal year from \$110,000 to \$127,000.

The construction cost limitation on buildings should be increased in fiscal year 1984 to maintain the previous values of these authorizations. Increases requested are derived from conservative estimates of cost changes applicable in the construction industry.

The third change would increase the cost limitation specifically for Beltsville. The present limitation has not been changed since FY 1959 and is insufficient considering the continual escalation of construction costs, age of facilities, and value of buildings at the Beltsville Agricultural Research Center Complex.

AGRICULTURAL RESEARCH SERVICE

Appropriation Act, 1983.....	\$454,378,000
Budget Estimate, 1984.....	472,410,000
Increase in appropriation.....	<u>+18,032,000</u>

Adjustments in 1983:

Appropriation Act, 1983.....	\$454,378,000
1983 Pay Cost Supplemental.....	+6,442,000
Activities Transferred, Net.....	<u>-598,000 a/</u>
Adjusted base for 1983.....	460,222,000
Budget Estimate, 1984.....	472,410,000
Increase over adjusted 1983.....	<u>+12,188,000</u>

a/ Includes transfer from Statistical Reporting Service of \$190,000, transfer from the Office of Minority Affairs of \$70,000, transfer to the Office of the Secretary of \$454,000, and transfer to the Office of Information Resources Management of \$404,000.

SUMMARY OF INCREASES AND DECREASES
(On basis of appropriation)

<u>Item of Change</u>	<u>1983 Estimated</u>	<u>Program Changes</u>	<u>1984 Estimated</u>
Basic research on animal genetic engineering.....	\$5,400,000	+\$750,000	\$6,150,000
Basic research on plant genetic engineering.....	2,630,000	+1,250,000	3,880,000
Postdoctoral fellowships in food and agricultural sciences.....	570,000	+500,000	1,070,000
Fundamental research on bioregulation to control losses and enhance value for exports.....	3,487,000	+1,000,000	4,487,000
Research on mechanisms of degradation and stability of products-soybeans, wheat, corn.....	1,570,000	+550,000	2,120,000
Human Nutrition research.....	27,631,000	+1,200,000	28,831,000
All Other.....	<u>418,934,000</u>	<u>+6,938,000a/</u>	<u>425,872,000</u>
Total Available.....	<u>460,222,000b/</u>	<u>+12,188,000</u>	<u>472,410,000b/</u>

a/ Proposed increase of \$6,938,000 for annualized and absorbed pay increases effective in FY 1983 but which are necessary to carry out the programs proposed for FY 1984.

b/ Total funds available to conduct basic research in FY 1983 and FY 1984 is \$217,070,000 and \$235,857,000 respectively.

PROJECT STATEMENT
(On basis of adjusted appropriation)

Project	1982		1983 (estimated)		Increase or Decrease	1984 (estimated)	
	Amount	Staff: Years	Amount	Staff: Years		Amount	Staff: Years
1. <u>Research on animal production:</u>							
(a) <u>Animal production efficiency re-</u>							
search.....	\$78,052,219	1,674	\$86,693,000	1,676	\$+2,098,000	\$88,791,000	1,676
(b) <u>Research on housing.....</u>	592,955	11	525,000	9	+9,000	534,000	9
Total, Research on animal production....	78,645,174	1,685	87,218,000	1,685	+2,107,000(1)	89,325,000	1,685
2. <u>Research on plant production efficiency:</u>	164,016,425	3,371	181,502,000	3,384	+4,551,000(2)	186,053,000	3,384
3. <u>Research on the use and improvement of soil, water and air:</u>							
(a) <u>Research on con-</u>							
servation and							
use of land and							
water resources							
and maintaining							
environmental							
quality.....	39,748,937	809	46,705,000	809	+710,000	47,415,000	809
(b) <u>Research on watershed dev-</u>							
elopment.....	13,311,306	304	16,814,000	304	+267,000	17,081,000	304
Total, Research on the use and improve-							
ment of soil, water and air.....	53,060,243	1,113	63,519,000	1,113	+977,000(3)	64,496,000	1,113
4. <u>Processing, storage distribution, food safety & consumer services research:</u>							
(a) <u>Processing, storage and distribution efficiency re-</u>							
search.....	57,923,603	1,364	62,190,000	1,364	+2,712,000	64,902,000	1,364
(b) <u>Research to im-</u>							
prove human							
health and							
safety.....	25,184,458	527	25,327,000	527	+417,000	25,744,000	527
(c) <u>Research on con-</u>							
sumer services...	675,439	18	743,000	18	+13,000	756,000	18
Total, Processing, storage and distri-							
bution, food safety, and consumer ser-							
vices research.....	83,783,500	1,909	88,260,000	1,909	+3,142,000(4)	91,402,000	1,909

Project	1982		1983 (estimated)		Increase or Decrease	1984 (estimated)	
	Amount	Staff: Years	Amount	Staff: Years		Amount	Staff: Years
5. Research on human nutrition.....	25,465,298:	251:	27,631,000:	251:	+1,411,000(5):	29,042,000:	251
6. Repair and maintenance of facilities and energy retrofit	10,974,227:	--	11,092,000:	--	--	11,092,000:	--
7. Construction of facilities.....	--	--	--	--	--	--	--
8. Contingency Research Fund.....	1,000,000:	--	1,000,000:	--	--	1,000,000:	--
Unobligated balance	5,294,133:	--	--	--	--	--	--
Total available or estimate.....	422,239,000:	8,329:	460,222,000:	8,342:	+12,188,000	472,410,000:	8,342
Reduction for SLUC	+2,694,000:	--	--	--			
Reduction for Advisory Committees:	+156,000:	--	--	--			
Transfer to HNIS	+8,732,000:	--	--	--			
Transfer to Office of the Secretary	+445,000:	--	+454,000:	--			
Transfer to OIRM	+404,000:	--	+404,000:	--			
Transfer from SRS	-190,000:	--	-190,000:	--			
Transfer from Office of Minority Affairs:	- 70,000:	--	-70,000:	--			
Supplemental for pay costs.....	--	--	-6,442,000:	--			
TOTAL, APPROPRIATION:	434,410,000:	8,329:	454,378,000:	8,342:			

AGRICULTURAL RESEARCH SERVICE

Explanation of Program

Under the Agriculture, Rural Development and Related Agencies Appropriation Act of 1983, Agricultural Research Service carries out the following activities:

1. Research on animal production. -- Research is conducted to improve livestock (including poultry) productivity and to improve the quality of meat and livestock products through improved breeding, feeding, and management practices. Research is conducted to develop methods for controlling diseases, parasites, and insect pests affecting livestock. Research is also conducted on ways to reduce rural housing construction and operating costs and on ways to control insects affecting man.
2. Research on plant production. -- Research is conducted to improve plant productivity through improved varieties of food, feed, fiber, and other plants; develop new crop resources; and improve crop production practices, including methods to control plant diseases, nematodes, insects, and weeds.
3. Research on the use and improvement of soil, air, and water. -- Research is conducted to improve the management of natural resources, including investigations to improve soil and water management, irrigation and conservation practices; to protect natural resources from harmful effects of soil, water, and air pollutants, and to improve the environment; and to determine the relation of soil and water to plant growth, including impact on animal and human nutrition. The research includes studies on hydrologic problems of agricultural watersheds, and the application of remote sensing techniques in solving agricultural problems.
4. Processing, storage and distribution, food safety and consumer services research. -- Research is conducted to provide a basic reservoir of knowledge which will stimulate technological development and innovation in the processing, storage, and distribution of food and feeds and thereby improve productivity and reduce costs to the consumer. The research additionally provides support to the regulatory agencies in assuring the quality, safety, and nutrition of food and fiber, and in grading to facilitate movement in commerce and export. Research is conducted to reduce losses in post harvest handling of agricultural commodities including control of insects in storage and quality in export. Research is conducted on utilization of commodities, by-products, wastes and agricultural biomass as chemicals, alternative fuels and other critical materials.
5. Human nutrition research -- Research is conducted on human nutritional requirements and the composition and nutritive value of food as needed by consumers, and by Federal, State and local agencies administering food and nutrition programs.

The research performed by Agricultural Research Service (ARS) is authorized by the Department of Agriculture Organic Act of 1862 (5 U.S.C. 511), the Research and Marketing Act of 1946, as amended (7 U.S.C. 427,1621), the National Agricultural Research, Extension, and Teaching Policy Act of 1977 (7 U.S.C. 3101, 3222) and the Agriculture and Food Act of 1981 (7 U.S.C. 1281).

JUSTIFICATION OF INCREASES AND DECREASES

(1) An increase of \$2,107,000 for research on animal production efficiency consisting of:

- (a) An increase of \$1,357,000 for the annualization of pay that was absorbed in FY 1983 that is necessary to carry out the program in FY 1984.
- (b) An increase of \$750,000 for basic research on animal genetic engineering (\$5,400,000 available in FY 1983).

Need for Change. To improve production efficiency, several new areas of research and technology will be implemented. (1) New methods of controlling livestock diseases, parasites, and arthropod pests are needed as current methods (vaccines, drugs, and insecticides) are expensive, inadequate, difficult to control, and soon to become ineffective. (2) One of the major limiting factors in efficient animal production is the low reproductive rate of all species of food producing animals. A major improvement in animal reproductive efficiency is needed so that females will produce more offspring of high quality and of the desired sex each year. (3) Research is needed to provide basic knowledge of organisms, their hosts, and host organism interaction at the cellular level. Studies on the immune response of the host and the physiology of both the host and invader pathogen, parasite, insect, tick, and mite are needed. (4) Feed costs represent 55-70% of the cost of production of all classes of livestock. The efficiency of livestock production is dependent on the efficient use of feed to produce the desired animal products. Major gains for economic efficiency must be achieved by improvements in biological efficiency through economic utilization of nutrients.

Nature of Change. The requested increase will be used to initiate new research in genetic engineering and explore ways of manipulating genetic material through such technologies as recombinant DNA to develop vaccines, alter internal and external parasites, and concentrate desirable production and disease resistance genes. Studies will be initiated to develop methods for the application of cloning and genetic modification of embryos to improve animal productivity and their resistance to diseases and parasites; develop new and improved technology for predetermination of sex, embryo transfer and sperm, egg, and embryo storage. Research will be initiated to define the immunological, physiological, and cellular parameters needed to develop new technology for diagnosis and control of insects, other parasites, and diseases. Research will be initiated on basic metabolic mechanisms that control the absorption, assimilation, and utilization of nutrients, protein synthesis, and fat deposition to increase the efficiency of feedstuff utilization for the production of desirable animal products.

- (2) An increase of \$4,551,000 for research on plant production efficiency consisting of:
- (a) An increase of \$2,801,000 for the annualization of pay that was absorbed in FY 1983 that is necessary to carry out the program in FY 1984.
 - (b) An increase of \$1,250,000 for basic research on plant genetic engineering (\$2,630,000 available in FY 1983).

Need for Change. Increasing costs of production may be partially offset by improved plant germplasm which has a greater genetic potential for yield, resistance to pests, increased water use efficiency, and increased tolerance to extremes in temperature and other forms of plant stress. With the wide variety of plant germplasm and individual genes now available to U. S. scientists from the National Plant Germplasm System, there is an opportunity to use gene manipulation and genetic engineering to enhance this germplasm for increased commercial use. Along with the need for germplasm enhancement is the companion need to better understand the mechanism of genetic control of individual components of yield, the nature of pest resistance, and the biochemical and physiological processes that relate to gene expression.

Improved plant germplasm has contributed to increased yields during the past 50 years but productivity can continue to be increased only if new principles and technologies are developed. The pool of basic genetic knowledge must be replenished if we are to meet the expected demands for future domestic and export needs of food and fiber.

The identification of desirable genes and the development of fundamental knowledge on the control of reproductive development in plants are essential steps in the utilization of genetic engineering techniques to improve crop production efficiency. The Department has initiated an orderly, stepwise development of capability to respond to the national needs for innovative science and technology in this field. It is essential to continue this process.

Nature of Change. The purpose of this research is to improve plant production efficiency. Genes will be identified which regulate processes that enhance yield and increase the resistance of plants to insects and other pests. The underlying mechanisms by which these genes are regulated and expressed will be investigated. The control of reproductive mechanisms will be studied. Principles and technologies will be developed to transfer and combine more efficient genes into improved germplasm. Major plants to be investigated include corn, rice, sorghum, cotton, soybeans, sunflowers, as well as certain other species of forage and vegetable crops.

- (c) An increase of \$500,000 for postdoctoral fellowships in food and agricultural sciences (\$570,000 available in FY 1983).

Need for Change. Maintaining Department research competency depends upon a continuing infusion and updating of scientific expertise into the Department's food and agricultural research system. There is an opportunity for a Federal initiative to stimulate the development of scientific expertise while at the same time, enhancing Department research capabilities for the future.

Nature of Change.

The funds requested will be used to support approximately twenty scientists accepted for postdoctoral training under the direction of ARS scientists working on mission-oriented basic research at a Federal laboratory. The postdoctoral program will strengthen the Department's research capabilities by providing increased opportunities for postdoctoral scientists to introduce new ideas and approaches which will complement and challenge the experience and expertise of agency researchers. Ultimately the postdoctoral program will stimulate the development of centers of excellence at those laboratories selected as hosts for postdoctoral fellows.

- o Department research laboratories will be selected on a competitive basis to host postdoctoral fellows. Selection as a host will be contingent upon the ability to substantiate that they are functioning effectively and possess a critical mass of outstanding scientists in a given area of research. Close affiliation with a university will be given favorable consideration.
- o Postdoctoral fellows will be recruited from among recent doctoral graduates (U.S. citizens) for training in areas compatible with the ongoing research being conducted at the ARS laboratories selected as hosts and targeted for development as centers of excellence. ARS will involve university representatives in the selection process.
- o Postdoctoral fellows will be employed on a two year term appointment with a third year being optional on the part of both ARS and the postdoctoral fellow. The personnel slots used to employ postdoctoral fellows will allow for rotation among ARS labs.

- (3) An increase of \$977,000 for research on the use and improvement of soil, water and air consisting of:

- (a) An increase of \$977,000 for the annualization of pay that was absorbed FY 1983 that is necessary to carry out the program in FY 1984.

(4) An increase of \$3,142,000 for research on processing, storage, distribution, food safety and consumer services research consisting of:

- (a) An increase of \$1,592,000 for the annualization of pay that was absorbed in FY 1983 that is necessary to carry out the program in FY 1984.
- (b) An increase of \$1,000,000 for fundamental research on bioregulation to control losses and enhance value for exports (\$3,487,000 available in FY 1983).

Need for Change. Losses of farm products are increasing due to pests, increased regulatory constraints by importers, and longer storage of surplus commodities. These losses can be reduced significantly through development of new technologies. However, basic information is needed to provide new leads. Fundamental research on bioregulation should provide information needed to overcome constraints blocking technological breakthroughs in Department efforts to efficiently store, preserve, and export major products with better quality, fewer safety problems, and reduced loss. New markets could be developed through conversion of commodities to value-added products before export. For example, emphasis should be placed on conversion of bulk agricultural commodities such as corn (as whole corn or corn starch), wheat starch, and soybean oil into commercial feedstocks and solvent chemicals, products that have great value in foreign trade. The multi-billion dollar solvents market is currently dependent on petroleum based chemicals. The knowledge needs include: definitive information on the ecology, biochemistry, and physiology of microbial and insect pests and their interaction with commodities; biochemical mechanisms affecting product quality; hormonal regulatory systems; membrane function as a loss factor; and chemical/structural properties of connective tissues. Modern methods of genetic manipulation must be applied to pests and/or hosts as needed to achieve useful loss control.

Nature of Change. The basic research in this area will provide a more complete understanding of host-pest interaction, bioregulation, and commodity properties to control postharvest losses and enhance commodity value. The funds will initiate new programs and strengthen productive programs in the following areas:

- o Bioregulation of insect metabolism and population survival (\$300,000)
 - o Changes in membrane function in pre- and postharvest crops during stress (\$400,000)
 - o Genetic manipulation of microorganisms and plant cells for bioconversion of surplus commodities to acetic acid, alkene oxides, lysine, methionine, and other valuable products (\$300,000)
- (c) An increase of \$550,000 for fundamental research on mechanisms of degradation and stability of products for export--soybean, wheat, corn (\$1,570,000 available in FY 1983).

Need for Change. Prolonged on-farm storage of soybeans, corn, wheat and other commodities leads to more frequent infestations by insects as well as deterioration in product quality. Regulatory constraints devised by importer nations have and will continue to limit our overseas sales.

Regulatory constraints with researchable solutions have been identified by the Foreign Agricultural Service and Federal Grain Inspection Service. The proposed research program seeks to directly address these constraints on U.S. grain and oilseed exports. In response to issues raised by these agencies and by GAO, user groups and commodity trade organizations, this program will emphasize fundamental research on mechanisms of degradation, and stabilization of products for export, and fundamental research necessary to develop new pest control technologies to remove trade barriers for soybeans, wheat and corn.

Nature of Change. The funds will be used for new program starts in the following areas:

- o Development of fundamental knowledge emphasizing mechanisms of survival of stored product insects leading to new control technologies during on-farm storage, processing and export of grains and oilseed crops (\$300,000)
- o Elucidation of biological mechanisms and use of these mechanisms to control quality characteristics after harvest (\$250,000)

(5) An increase of \$1,411,000 for research on human nutrition (\$27,631,000 available in FY 1983) consisting of:

- (a) An increase of \$211,000 for the annualization of pay that was absorbed in FY 1983 that is necessary to carry out the program in FY 1984.
- (b) An increase of \$300,000 for research on nutrition needs of elderly and relationships of nutrition to aging - Human Nutrition Research Center on Aging at Tufts University, Boston, Massachusetts (\$3,887,000 available in FY 1983).

Need for Change. The percentage of the population in older age groups is rapidly increasing. Expenditures for food programs and medical programs for these groups are also increasing. To keep pace with these increases, it is extremely important to obtain information on the relationship of nutrition to aging and degenerative diseases, and on the nutrition requirements of the elderly. Current information on nutrient needs of the elderly is inadequate. Food programs designed for the elderly should be improved, and nutritionists working in health maintenance programs should be better able to advise on long-term relationships between diet and good mental and physical performance.

Nature of Change. The requested increases will strengthen the research program developed thus far and will provide personnel and equipment for the new facilities scheduled to be completed in FY 1983. The program will include studies on the relationship of nutrition to vision during aging, the relationship of nutrition to hormone

function, and the interactions between nutrition and drugs often taken by the elderly. New research programs will be coordinated with work at the National Institute of Aging and in other USDA and land-grant university laboratories. The research will be carried out by USDA scientists at the laboratory collaborating under a cooperative agreement with scientists from Tufts University and other universities within the geographic area which have related research interests.

- (c) An increase of \$300,000 for research on nutrition needs of infants and of women during pregnancy and during lactation - Children's Nutrition Research Center at Baylor College of Medicine, Houston, Texas (\$2,952,000 available in FY 1983).

Need for Change. In fiscal year 1979, Congress authorized the establishment of the Children's Nutrition Research Center at Baylor College of Medicine. Its mission is to determine the nutritional needs of pregnant and lactating women and of infants. In order to achieve its mission, a multi-faceted research program, to be implemented over a five-year period, was planned and developed.

The planned program is one-fourth implemented. Three of the four planned laboratories are partially functioning, but essential aspects of the research program in each have not been initiated, especially the methodological research components necessary to define nutritional needs for optimal growth and development. A fourth laboratory is needed to conduct research on the effects the diet of a pregnant woman has on the health of the child she delivers.

Nature of Change. Emphasis will be placed on determining the need for energy from food (calories) during pregnancy and lactation, as well as the need for energy for optimum growth and development during infancy. The effects of nutrition on physical and mental development in infants will also be explored. Work will take advantage of newly acquired equipment for determining energy expenditure and for tracing nutrients in the human body. This work will be coordinated with existing work in the Department of Health and Human Services.

- (d) An increase of \$300,000 for research on nutrition status assessment - Western Human Nutrition Research Center, San Francisco, California (\$3,476,000 available in FY 1983).

Need for Change. New and better methods are needed for measuring food intake, for measuring nutrition status, and for studying nutrient requirements in human subjects. There is a need for good, convenient and rapid methods to detect individuals who do not get adequate amounts of dietary nutrients. A program is needed to develop the methodology which will permit the acquisition of research knowledge critical to the improvement of our capabilities for nutrient status assessment.

Nature of Change. Scientists of USDA laboratories in the Western Human Nutrition Research Center at the Letterman Army Institute of Research (LAIR) will collaborate under a cooperative agreement with scientists from the University of California. The approaches used in the research will include the study of human volunteers living under metabolic ward conditions as well as pilot field surveys designed to test methodology. In addition, metabolic studies will be conducted utilizing experimental models of animal function.

- (e) An increase of \$300,000 to strengthen and implement high priority research in nutrient requirements and relationships to health - Human Nutrition Research Center, Grand Forks, North Dakota (\$3,714,000 available in FY 1983).

Need for Change. The necessity for a vigorous research program was pointed out by Congress in the Food and Agriculture Act of 1977 in which it is stated "Congress hereby finds that there is increasing evidence of a relationship between diet and many of the leading causes of death in the United States; that improved nutrition is an integral component of preventive health care; that there is a serious need for research on the chronic effects of diet on degenerative disease and related disorders; that nutrition and health consideration are important to United States agricultural policy; that there is insufficient knowledge concerning precise human nutritional requirements..." Improved knowledge of human nutrition needs would benefit large portions of the U.S. population. It would help action and regulatory programs in their efforts to improve the nutrition of their clientele.

Nature of Change. This work will be done at the newly expanded facilities at the Human Nutrition Research Center in Grand Forks, North Dakota. It will include studies to identify the metabolism and physiologic roles of trace elements, to characterize the consequences of trace element deficiencies and to define trace element requirements for humans under conditions of stress and physical exercise.

STATUS OF PROGRAM

Agricultural Research Service (ARS) conducts mission-oriented research to perpetually ensure an abundance of high-quality, nutritious, reasonably priced food and other agricultural products to meet domestic and world needs while maintaining environmental quality. ARS uses coordinated, interdisciplinary approaches to conduct basic and applied research pertaining to livestock, plants, soil-water-air resources, environmental quality, energy, processing, storage and distribution efficiency, food safety and quality, nutrition, consumer service, and agriculturally related health hazards.

Research is conducted at numerous locations in the United States, Puerto Rico, Virgin Islands, and several foreign countries. Much of the research is conducted in cooperation with the State Agricultural Experiment Stations, other State and Federal agencies, and private institutions.

RESEARCH ON ANIMAL PRODUCTION

Current activities: The demand for meat and animal products for human consumption continues to increase in the United States, as does the demand throughout the world for animals and animal products from the United States. New technology is needed to enable livestock producers to increase production efficiency to assure a reliable and safe supply of animal protein while at the same time conserving resources and reducing production costs. ARS research is conducted to improve the efficiency of producing healthy animals and safe, high-quality animal products by improving their genetic and reproductive capacities; improving feeding and management practices; increasing the use of feed sources not suitable for humans; improving the design and use of equipment; and developing more efficient uses of energy. Additionally, research is conducted to diagnose, prevent, and control diseases caused by infectious microbes, parasites, insects and other pests, and by toxicants; improve water and waste systems; and reduce problems caused by insects that affect man.

Research programs on the diagnosis and control of foreign and vector-borne diseases and parasites such as foot-and-mouth disease, African swine fever, Rift Valley fever, and screwworms are unique and of great importance to the livestock industry.

Other research emphasizes basic approaches to help meet long-term objectives such as control of pseudorabies, bluetongue, scabies, and ticks; improvement of reproduction through integrated study of pathology, toxicology, physiology, nutrition, and management; conservation of energy on livestock farms; and increased lean meat deposition through understanding and manipulating the cellular processes of protein and fat synthesis.

Selected examples of recent progress:

Breeding potential of tom turkeys is enhanced. The Beltsville Poultry Semen Extender, especially when used in flocks under a new restricted protein feeding program, will reduce the need for tom turkey breeders to less than one half those now required. Quality semen for artificial insemination can be diluted and stored for short-terms under field conditions. Tom turkeys grown and maintained on restricted protein feeding programs were found to have fewer leg problems and less mortality, and produced an adequate volume of semen for longer periods of time.

Improved time saving methods developed for detecting paratuberculosis in cattle. A new antigen prepared from the protoplasm of Mycobacterium paratuberculosis, the agent of this disease, has increased specificity for use in the gel diffusion and immunosorbent assay test. Newly developed cultivation media for M. paratuberculosis allow antibiotic assays to be completed in a week rather than a month. These developments have significant potential for reducing time in performing serological testing, increasing test sensitivity, and permitting early identification of infected animals.

Diagnostic test developed for heartwater disease. Heartwater, a tick-transmitted disease of cattle and sheep caused by Rickettsia ruminantium, has recently spread from Africa to the Caribbean Islands. A fluorescent antibody test developed by ARS researchers for diagnosis of the disease from blood samples shows promise for screening animals that are imported into the United States.

Monoclonal antibody technique applied to coccidiosis vaccine development. Hybridomas are hybrids between cancer cells and antibody-producing cells and coccidiosis is a dysentery caused by a protozoan parasite. Hybridomas that produce monoclonal antibodies against specific species and life-stages of the protozoan parasites causing coccidiosis in birds have been developed. These antibodies are being used to determine which coccidial antigens are needed for vaccine technology. Antibodies have been identified that prevent development and penetration of the parasites into host cells. These discoveries should lead to identification of antigens needed to develop effective vaccines.

Smooth muscle stimulant found to improve sperm transport and fertilization rate. Studies on sperm transport mechanisms are part of ARS' efforts to improve the fertility of farm animals. Injection of ergonovine, a compound that stimulates uterine contractions, into rabbits and sheep before insemination was found to increase by tenfold the number of sperm in the uterus and oviducts. The rate of fertilization of ova in females inseminated with low numbers of sperm was increased in rabbits and sheep.

Swine reproductive failures reduced by bivalent vaccine. Pseudorabies is a herpes disease that can cause 100% mortality in young swine; parvovirus infection in swine causes significant losses from reproductive failures (resorbed embryos and stillborn or mummified pigs). ARS scientists have developed an inactivated bivalent vaccine for these two viruses and found it to be effective in preventing pseudorabies virus and parvovirus-induced reproductive failure in swine. The bivalent vaccine is expected to reduce producers' vaccination costs significantly.

Imported fire ant queen attractant identified. A pheromone (attractant) consisting of three components produced by the queen of the red imported fire ant has been isolated, identified, and synthesized. The synthesized pheromone elicits queen recognition and queen-tending responses from workers of the same species and gives responses equivalent to those of the natural queen extract. When small pieces of rubber are treated with the synthetic pheromone, workers respond by clustering around the rubber, and thus carry the pheromone back to the nest. It is anticipated that this synthesized queen pheromone will be useful in enhancing the specificity and effectiveness of baits designed to control the red imported fire ant, a serious and destructive insect pest in most Southeastern States.

Marek's Disease control substantially enhanced by embryonal vaccination. In several poultry production areas, some broiler chicks vaccinated against Marek's Disease do not develop immunity. ARS research indicates that vaccination of embryos three days prior to hatching will prevent the occurrence of Marek's Disease in chicks exposed to the virus at one day of age. Embryonal vaccination had no adverse effects on hatchability or survival.

Methods being developed to protect military rations from insect damage. ARS scientists are studying methods to protect Department of Defense "Meals, Ready-to-Eat" and assault rations from damage by stored product insects. Findings indicate that packages must be aerated after fumigation for a longer period of time than has been generally recommended, and that fumigants entering improperly sealed packages may leave residues exceeding legal tolerances. Retrofit packaging (over wrapping a quantity of individual units) to provide insect resistance for rations currently stored throughout the world has shown encouraging results and is being evaluated. Although the research is directed to solving problems of military importance, the results also have civilian application.

RESEARCH ON PLANT PRODUCTION

Current activities: Research is in progress to develop new and improved technologies for increasing crop productivity in order to increase net farm income, reduce inflationary pressure on consumers, and strengthen the Nation's export capacity. ARS scientists will continue to look for ways to remove barriers to efficient productivity of major export crops and to develop integrated crop production and protection practices that are environmentally sound and energy efficient.

Research in FY 1984 will include emphasis on bioregulation of basic processes such as photosynthesis, nitrogen fixation, stress tolerance, seed germination, mating activity of major insect pests, and the host-plant resistance to many crop pests. Genetic engineering technology will be developed and used to broaden the base of useful germplasm. In addition, through interspecific hybridization and other means, the reservoir of useful genes will be incorporated into improved germplasm populations.

Selected examples of recent progress:

Plant Germplasm Acquisitions. Over 4,000 new accessions of germplasm for such important crops as forage grasses and legumes, cotton, alfalfa, beans, fruit and nuts, and several vegetables have been collected which are being preserved and evaluated for future use. Genetic diversity provides the raw material for improving crop plants, and the new accessions help preserve germplasm otherwise vulnerable to rapid disappearance from areas of the world where crops originated.

Germplasm Documentation Computerized. More than 400,000 crop germplasm accessions have been documented through a computer system. The documentation provides the core information on all germplasm accessions entering the National Plant Germplasm System and represents a major step in fostering exchange of information among all germplasm curators and other users throughout the System.

New Northwest Plant Germplasm Repository at Corvallis, Oregon. Establishment of the Northwest Plant Germplasm Repository marks the beginning of a new program in the National Plant Germplasm System. This is the first facility in a nationally coordinated system of clonal repositories that will provide a major source of germplasm for researchers and plant breeders

of USDA, State Agricultural Experiment Stations, and industry throughout the country. The Northwest Plant Germplasm Repository makes possible for the first time a national program to permanently preserve genetic resources of crops such as pears, strawberries, raspberries, blueberries, filberts, hops and mint. Germplasm of these crops must be maintained by growing plants, since variety identity cannot be retained in stored seed.

Citrus disease resistant germplasm brought from China. Germplasm from small-fruited wild relatives of citrus from China and Australia have been used by ARS scientists to produce hybrids through crosses with commercial citrus varieties. Earlier shown to have greater tolerance to cold, the hybrids have also been found to be nearly immune to tristeza virus disease and tolerant to Phytophthora, root-rot fungus. These two diseases alone now cause losses in excess of \$30 million to the U.S. citrus industry. This newly discovered disease resistant germplasm will be used extensively in the citrus breeding program.

New insect resistant wheat germplasm made available for variety improvement. Two new wheat genes increase the supply of genetic stocks of wheat resistance to the Hessian fly, a serious wheat pest. The H₁₂ gene was derived from Luso wheat and has great potential for the eastern soft wheat region. The second gene is derived from Triticum tauschii, an original progenitor of modern wheats. The resistance from these two sources is expressed as the inability of all known Hessian fly biotypes to survive.

Fast-growing, nitrogen-fixing bacteria isolated from soybean root nodules collected in China. ARS scientists found that these new isolates are physiologically distinct from slow-growing soybean rhizobia (soil bacteria that fix atmospheric nitrogen). The new isolates form effective nitrogen-fixing symbioses with wild soybean and the soybean cultivar "Peking," but they are largely ineffective as nitrogen-fixing symbionts with common commercial soybean cultivars. Because these new isolates possess the physiological attributes of both the fast-growing Rhizobium and the symbiotic traits of the slow-growing Rhizobium, they may well represent an important link between these two major groups. They should prove useful in genetic studies and in studies on host-determined factors of nitrogen fixation in soybeans.

New monoclonal antibodies to plant viruses developed. Some of the first monoclonal antibodies to plant disease viruses have been developed utilizing the new hybrid animal cells procedures. These include Prunus necrotic ringspot, Apple mosaic, Tobacco streak, and Alfalfa mosaic viruses. The feasibility of developing monoclonal antibodies to a wide array of plant viruses is demonstrated by this research. These new, highly specific, high-quality antibodies will be extremely useful for identification and quantitative assay of plant viruses, for diagnosis of virus caused diseases, and for measuring similarity and differences among viruses and virus strains.

New kind of plant cell derived through genetic engineering. ARS scientists succeeded in transferring a gene that directs the production of a major storage protein from its native location in the French bean seed into the foreign environment of a sunflower cell. The gene produces ribonucleic acid, the material that carries genetic information. This model genetic transfer system is the first step in creating genetic variations now unknown because of sterility barriers between species and

genera. This groundwork might well become the foundation for the technology of the geneticists and breeders of the 21st century.

First natural enemy of curly dock weed found in Italy. Curly dock is a perennial, pernicious weed that infests pastures, hay fields, meadows, and gardens throughout the U.S. In Italy clearwing moth larvae were found infesting the roots of curly dock and other closely related dock species. The moth has now been introduced into U.S. quarantine facilities for final evaluation prior to its release as the first biological control agent of curly dock in this country.

New wild oat control technology cuts losses 75% and increases farm income \$500 million. ARS scientists in cooperation with scientists of the North Dakota Agricultural Experiment Station, developed outstanding chemical, cultural, and crop rotation practices that have been combined in integrated weed management systems for the control of wild oats in wheat, barley, sunflower, soybeans, and other crops grown in the north central states. This technology has cut the losses caused by wild oats by 75% resulting in a net annual increase in farm income of more than \$500 million annually for the past three years.

Sex attractant pheromones for important agricultural pest identified and synthesized. During the past year, potent pheromones were isolated and synthesized for the following insects: southern corn rootworm, velvet bean caterpillar, western grapeleaf skeletonizer, western bean cutworm and Mexican fruit fly. Pheromone research is an important component in the systems approach to integrating advance, proven technology into more cost-effective, environmentally acceptable, and energy-conserving pest management.

Improved method developed for sterilizing boll weevils. Two synthetic hormonal compounds, ecdysteroids, were used instead of the chemical diflubenzuron for sterilizing female boll weevils following acute irradiation of males and females. The resulting sterile insects were more competitive than diflubenzuron-fed irradiated males. The potential for increasing the effectiveness and use of sterile boll weevils provides an opportunity to reduce the costs of expanding the boll weevil eradication program into additional areas of the Cotton Belt.

Plant pathogens show promise for weed control. ARS scientists determined the effectiveness of the fungus Alternaria macropsora in controlling spurred anoda, a damaging and difficult-to-control weed in cotton. The scientists also participated in cooperative studies in developing the first plant pathogen to be used as a bio-herbicide for control of several important weeds in rice production. They developed the efficacy and toxicology data necessary for registration and sale of the pathogen for selective weed control. These achievements provide new approaches to biological weed control, and they provide technology for strengthening integrated weed management systems.

First male-sterile, disease-resistant sugarbeet germplasm released. The world's first male-sterile, rot-resistant sugarbeet has been released and registered. This germplasm is available for private breeders to incorporate resistance to rhizoctonia disease directly into the female parent of hybrids. The resistant germplasm has the potential to combine with existing resistant pollinators to produce hybrids with the highest available level of resistance. Such resistance will greatly reduce sugarbeet losses from rhizoctonia disease, now estimated at \$20 million annually.

New tall fescue improves animal performance. Some 35 million acres in the U.S. are planted with tall fescue, an important forage for beef cattle. Tall fescue contains two naturally occurring chemicals, both alkaloids, that reduce animal performance: perloine, which seems to interfere with digestion, and loline, which causes metabolic stress. A new tall fescue variety has been developed that contains low levels of perloine. Loline, caused by a fungus, can be controlled by planting fungus-free seed. The newly developed fungus-free variety will improve animal performance and has the potential to increase livestock production on fescue pastures by 50 percent.

Naturally occurring fungi found to control plant diseases. ARS scientists have found three naturally occurring fungi--*Talaromyces*, *Sporidesmium*, and *Trichoderma*--that destroy other fungi responsible for serious diseases in crops. The beneficial fungi, when applied to the soil, have substantially reduced losses in such crops as chrysanthemum, eggplant, and lettuce. They have been shown to destroy disease-causing fungi in a wide variety of vegetable, oilseed, and forage crops, and their use has substantially reduced reliance on pesticides.

RESEARCH ON THE USE AND IMPROVEMENT OF SOIL, WATER, AND AIR

Current activities: Research is conducted to develop technology for using and conserving soil, water, and air resources while sustaining optimum agricultural productivity. Much of this research deals with developing management systems and strategies that optimize the production of food and fiber, minimize the adverse effects of agricultural systems on the environment, and assure the efficient use of our soil, water, and air resources for future generations. Investigations include those aimed at reducing salt damage to soils, crops, and water; improving irrigation and drainage of agricultural lands; developing tillage practices for reducing soil erosion, and for improving soil properties and crop growth; managing and using precipitation and solar energy for crop production; reclaiming and revegetating land areas disturbed by man; utilizing, managing, and conserving soil fertility for increased production and nutritional quality of plants and animals; preventing pollution of and improving the quality of soil, water, and air; controlling erosion by water and wind, and sedimentation and conserving and managing agricultural water resources. Much of these investigations deal with developing an understanding of the basic physical, chemical, and biological processes involved so that the effects of agricultural systems can be accurately interpreted, and models of these systems, which have regional and national application as planning and management tools, can be developed.

In 1984, emphasis will be placed on evaluating the effect of erosion on soil productivity; understanding the mechanisms involved in nonpoint source pollution and predicting the effect of various management practices on water quality; developing conservation tillage systems; and the use of remote sensing technology in agriculture. The major emphasis of the research is to expedite the development of farm management systems that provide the farmer and the land use planners with improved information for decisions.

Selected examples of recent progress:

Soil erosion-productivity model developed. A model has been developed for predicting the effects of soil erosion on soil productivity. Known as EPIC (Erosion Productivity Impact Calculator), this is a national model that can be used in providing information and projections for USDA's activities in support of the Resource Conservation Act. EPIC simulates processes in hydrology, weather, erosion-sedimentation, soil properties, nutrient

cycling, plant growth, and tillage. The model has been tested on 11 sites throughout the U.S. to estimate erosion, cover, and productivity. EPIC will enable the Soil Conservation Service to improve its assessment of the effects of erosion on the productivity of the Nation's soils.

Semi-automated gated pipe irrigation system increases water application efficiency. A field scale evaluation of a semi-automated gated pipe irrigation system in Idaho showed that approximately 50% less water was applied with the new system as compared with siphon tubes. An added benefit from this new technology was a 17% increase in wheat yield, even though less water was applied. This system has significant potential for increasing water use efficiency and stabilizing crop yields in areas where water supply problems occur.

Automatically controlled subsurface trickle irrigation system found to be feasible. Tomatoes irrigated by this system yielded 13 to 31 tons more per acre than those irrigated by furrow systems in research tests conducted by ARS scientists. Benefits of the system include greater yields of marketable tomatoes; reduced water, energy and labor requirements; and more irrigation management options. Life expectancy of the system is estimated at ten years. The cost of the system could likely be recovered in one or two years.

Techniques are being developed to produce cotton with brackish drainage water. By using good quality water during seedling establishment and blending it with saline drainage water for the balance of the growing season, yields of 82% of those obtained with conventional water supplies were achieved. These techniques will increase agricultural water supplies, reduce the volume of drainage water for disposal, and reduce drainage costs in arid irrigated areas. These benefits more than offset the reduced yields from not using good quality water throughout the entire season.

Guidelines developed for diagnosing, controlling and reclaiming saline-seep areas. Technologies have been made available to public service agencies, farm consultants, and farmers concerned with saline-seep problems. Based on research conducted by ARS scientists, results show that much salt-damaged land can be reclaimed in three to five years by proper water, soil, and crop management practices and that crop yields can be restored to original levels.

Predictive models developed for selection of soil tillage practices. Computer models were developed to provide information to farmers and extension agents to help them select effective conservation tillage practices. The research based models predict appropriate tillage and residue management practices to optimize soil temperature, soil compactness, organic matter content, and nitrogen transformations for high and sustained soil productivity. This development has reduced the number of experimental trials needed to develop appropriate conservation tillage systems.

Crop yields are influenced by degree of erosion, fertilizer practices and development of new crop varieties. Multi-disciplinary teams have been organized at the national level to develop a method of predicting production losses due to erosion. The ARS National Soil Erosion Laboratory is responsible for verification of components of the model affecting the Cornbelt of the United States. The 1981 crop year data--collected under above normal rainfall conditions--showed organic matter and phosphorus levels significantly lower on severely eroded soils than on slightly eroded soils. Data for the 1982 crop year was obtained with more normal rainfall conditions. Preliminary observations indicate organic matter and

phosphorus levels will follow the same pattern as last year's data. Successful verification of model components will provide a method whereby the Soil Conservation Service, Agricultural Stabilization and Conservation Service and other USDA agencies can target expenditure of their resources to more effectively combat the effects of soil erosion on the Nation's land and water resources.

Removing crop residues reduces corn and soybean yields. Results of a 4-year study indicate that removing all crop residues from the soil surface reduces corn and soybean yields by 18% and 25% respectively. Residue removal decreased available soil water, increased soil erosion and nutrient loss, increased soil and canopy temperatures, enhanced physiological stress during hot, dry periods and ultimately reduced plant yields. These results emphasize the need for maintaining a surface cover of crop residues on some soil types and in some cropping systems to maintain high yields and sustain long-term soil productivity.

Freeze-inhibiting atmospheric layer detected by satellite. Thermal data from a satellite were used to detect an atmospheric layer that, while not visible to ground observers, retards the earth's radiation loss to space on a freeze night. This technique could have an important application in freeze forecasting. Knowledge of the presence of the retarding atmospheric layer would justify an upward revision of forecasted minimum temperatures to save growers from using expensive freeze protection measures.

RESEARCH ON PROCESSING, STORAGE, AND DISTRIBUTION, FOOD SAFETY AND CONSUMER SERVICES

Current activities: The current postharvest science and technology program is targeted to increase the information and knowledge base needed to maximize the use of agricultural products in domestic and export markets. The primary objectives of the program are to increase the quality and uses of agricultural commodities and materials; to ensure the safety of agricultural products and workers; to eliminate impediments to commodity export; to reduce losses caused by pests, spoilage, and physical and environmental damage; and to increase the efficiency of processing, handling, and distribution systems.

In pursuit of these objectives, the program in FY 1984 will emphasize fundamental research, research required to increase agricultural exports, and research that responds to the stated needs of action agencies. Fundamental research will include investigations that provide a more complete understanding of the biological processes in agricultural products and commodities, and that are keys to improving food quality and safety and to reducing losses. For example, understanding the factors involved in the formation of mycotoxins can provide the basis for programs to prevent or control food and feed contamination by these toxins. Research supporting action agency programs will emphasize (1) commodity treatments needed to permit free trade of commodities from areas infested with pests (e.g., Mediterranean fruit fly) and technologies to control insect pests in stored grain and oilseeds; (2) more rapid instrumental and chemical techniques to monitor toxic and drug residues in meat and poultry; and (3) development of the knowledge base needed to control microbial safety hazards in food and ensure the safety of grain inspectors and of grain elevator and textile mill workers. Additional effort will be targeted to supporting export commodity programs; developing innovative pest management systems that will reduce losses during storage, handling, and domestic or export distribution; and developing means to remove constraints upon export, such as control over smut-infested wheat. Resources will continue to be applied to developing the following: basic information on those constituents and mechanisms critical to

determining market quality of commodities and products; new uses for grains and dairy products; new concepts and innovative technologies for converting agricultural commodities, such as soybeans and cottonseed, to acceptable products; and rapid, automated, nondestructive grading technologies to improve the efficiency of the postharvest system.

Selected examples of recent progress:

New detection system for improved security against exotic pests. A system is under development that more effectively and efficiently provides the security needed by the Animal and Plant Health Inspection Service for excluding exotic pests that would be damaging to U.S. crops and livestock. The system will depend on X-ray imaging and chemical sensing of the pest vectors, mainly fruit, vegetables, and meat concealed in packages and travelers' baggage. Onsite tests of the instrumentation at several U.S. airports have demonstrated the effectiveness of the imaging and sensing technologies. Test-mode systems are already increasing security against fruit fly reinfestation in California.

Potential demonstrated for using plant growth regulators to increase crop quality. ARS scientists found in exploratory studies that growth regulators applied to peanuts appear to inhibit the production of lipoxigenase, an enzyme critical to the development of rancidity and off-flavor in the nut. Preliminary data suggest that storage stability of peanuts from treated plants also is enhanced.

New treatments developed to ensure the acceptability of U.S. fruits in foreign markets. Cold treatment, methyl bromide treatment, or a combination of the treatments are safe for some varieties of citrus, strawberries, and cherries and are effective against fruit flies and codling moths. These treatments may replace fumigation with ethylene dibromide on some commodities. Japan has approved the treatments proposed for cherries and strawberries and is considering approving the treatment proposed for grapefruit. These measures would help to assure the continuation of the \$200 million U.S. export market for these commodities in Japan.

New standards developed for processing pork products. Research completed on the heat inactivation of mycobacteria in pork products has permitted the Food Safety and Inspection Service to write new standards for processing meat from swine "passed-for-cooking." Lower processing temperature requirements will make it possible to use additional parts of the carcass in products such as frankfurters and bologna, thus saving about \$6 million per year.

Intermediates in biosynthesis of the plant hormone ethylene identified. Ethylene is a simple plant hormone which triggers fruit ripening. Studies of biosynthetic pathways to ethylene have shown that the rate of ethylene formation is governed by the amount of N-malonylamino cyclopropane carboxylic acid, a storage form of an ethylene precursor. This finding contributes to an understanding of the ripening process and suggests ways for manipulating the process so that it can be hastened or delayed. Crops might thus be made to ripen in accordance with market demands and at optimum quality for sale and preservation.

Location of genes critical to wheat protein quality identified. Gliadin proteins are important to improved baking quality of wheat bread. The location of genes on chromosomes 1 and 6 have been identified for more than 30 different gliadin components of the good-quality-bread wheat "Cheyenne". This information will be important to the future use of recombinant DNA

techniques in modifying wheat.

Rapid microwave treatment developed for producing salmonella-free foods for Title II programs. ARS scientists, working cooperatively with commercial companies, determined that processing temperatures necessary to destroy salmonella in bagged corn-soy-milk blends could be achieved in a continuous microwave tunnel. Load levels of one organism per gram were reduced to nondetectable levels with no significant change in nutritional value. This development provides an efficient and rapid means for guaranteeing the absence of salmonella in packaged products and avoiding the recontamination potential inherent in alternative prebagging treatments.

Effects of Vomitoxin, a mycotoxin produced by the fungus causing wheat scab, evaluated in animals. Vomitoxin is a mycotoxin that may be present in grain infested by the fungus Fusarium graminearum. Quantities of vomitoxin sufficient for animal toxicity studies were prepared by solid substrate fermentation on corn or rice. The vomitoxin was distributed to veterinarians and animal scientists in the United States, Canada, and Austria for evaluation of its effects on small laboratory animals, chickens, swine, and turkey poults. Vomitoxin appears to be the first mycotoxin reported which will cause hemorrhaging in chickens.

Partial sodium chloride replacement found for processed meats. Processed meat products, including frankfurters, add a significant amount of sodium to our diets. Excessive dietary sodium is believed to contribute to development of high blood pressure in genetically hypertensive people. To reduce the high sodium content of frankfurters, potassium chloride was partially substituted for sodium chloride. As much as 50% of the sodium chloride could be replaced with potassium chloride without adverse effect on the processing properties, textural properties, or flavor of the frankfurters. No bitterness was detected, and the sodium content was reduced by 37%.

RESEARCH ON HUMAN NUTRITION

Current activities: The major USDA program in human nutrition research is within ARS. For best use of all available expertise with the resources available, it is necessary to carefully coordinate the work of several groups within the Department. Research and evaluation projects exist in ES, FNS, HNIS, and CSRS. Nutrition information and education projects exist in FNS, HNIS, FSIS, ES, and OGPA.

Nutrient needs vary according to age, sex, physical activity, and health status. By use of both human subjects and laboratory animals, investigators are determining the ranges in levels of nutrients needed by humans. Emphasis is placed on the special needs of infants and young children and the elderly.

Studies are being conducted on nutrient content of foods, biological processes that influence availability, and interactions among nutrients and other dietary components, such as fiber. New and increasingly sophisticated techniques and instrumentation also are being developed as an integral part of these studies.

Knowledge gained about people's nutritional needs at various stages in life, their food consumption patterns, and the nutritive value of the food they eat, is applied in many ways from establishing standards for Government food and nutrition programs to developing guidelines that help people know what foods to eat for a healthful diet.

Selected examples of recent progress:

Evidence found that fiber-rich diets can delay or prevent onset of osteoporosis. This bone disease, characterized by a loss of bone density and a common consequence of aging, especially among women, is believed to be hormonally determined. ARS scientists have found evidence that fiber-rich diets affect hormonal balance in such a way as to favor calcification of bone and, thus, can delay or prevent the onset of osteoporosis. Their finding emphasizes the relevance of long-term good nutrition to the course of age-related degenerative changes.

New multi-element analyzer developed. The analyzer, a fully automated, multicomponent system based on atomic absorption, can simultaneously analyze as many as 16 minerals and trace elements in one food sample. Without such an analyzer, these food components must be analyzed individually, a time-consuming and expensive task. The analyzer will enable the analysis of many more foods than has heretofore been possible and at a reduced cost.

New procedure developed for determining Vitamin K deficiency. Vitamin K is required for the last step (carboxylation) in the formation of prothrombin, a substance necessary to produce normal clotting of the blood. The new procedure uses an antibody directed against the non-carboxylated precursor of prothrombin to detect a lack of Vitamin K. The procedure will be valuable in monitoring the Vitamin K requirement in the elderly. Tested on a free-living population of elderly persons, the procedure indicated that 10% were deficient in the vitamin.

Maternal nutrient requirements should be reevaluated. Research was conducted to provide information for the estimation of maternal nutrient requirements and allowances during lactation. Of the lactating women studied by ARS scientists a significant proportion consumed less than two-thirds of the recommended allowance for calcium and iron. A smaller proportion of them consumed less than two-thirds of the recommended allowances of Vitamin A and C. The data suggests a need for reevaluation of the recommended allowances and also points out the need for research to determine if the intake of the nutrients studied are adequate to meet the needs of women.

Chromium deficiency found to be one possible cause of impaired glucose tolerance. Many studies have shown that impaired glucose tolerance develops with age in the majority of Americans. ARS researchers conducted a study to determine the proportion of people who would benefit from chromium supplementation. More than one-half of the subjects studied had abnormal glucose metabolism and were normalized by increasing their chromium intake. These findings suggest chromium deficiency as one of the causes of impaired glucose tolerance.

Daily food intake of adults studied. A one year study of the daily food intake of female and male adult volunteers by ARS scientists showed that body weight was maintained with an average intake of 1840 kcals (kilo-calories) in females and 2730 kcals in males. This is 270 and 460 kcals more, respectively, than reported in the Nationwide Food Consumption Survey. These results suggest that the nutritional problems indicated by earlier consumption surveys may be less severe than previously believed due to underestimation of calories consumed.

CONTINGENCY RESEARCH FUND

The Contingency Research Fund, established by Congress in fiscal year 1962, is designed to provide a ready source of funds to meet unforeseen and immediate research needs. Releases from the fund are generally made in situations where an emergency exists, or for special needs such as an unexpected scientific "breakthrough," or for new diseases or pest problems where it appears inadvisable to wait for consideration of a request for funds for the project in the regular budget process. In allocating funds, the procedure is to make no commitments for allocations from the fund beyond the current year.

<u>Animal Production Efficiency Research:</u>	<u>1982 Obligations</u>
Overhaul personnel carrier M.S. <u>Shahan</u> , Plum Island, NY.....	\$ 68,462
Safety-related needs at Plum Island Animal Disease Center, Plum Island, NY.....	353,500
Research on Bluetongue (Extramural).....	195,750
Partial-funding of Bluetongue expertise and screening capability at the Meat Animal Research Center, Clay Center, Nebraska.....	12,288
Establish standby laboratory for screwworm research, Mission, Texas.....	50,000
Establish facility for pseudorabies control, Clay Center, Nebraska.....	95,000
<u>Crop Production Efficiency Research</u>	
Establish satellite field laboratory in Venezuela for Africanized bee, Baton Rouge, Louisiana.....	100,000
Research on Whitefly biology and etiology of transmitted viruses of horticultural and agronomic crops, Salinas, California.....	100,000
Research on wheat scabby, Northern Regional Research Center, Peoria, Illinois.....	<u>25,000</u>
Total, 1982 Obligations, Contingency Research Fund.....	<u><u>\$1,000,000</u></u>

STATEMENT OF OBLIGATIONS AND STAFF-YEARS BY LOCATION.

(On basis of adjusted appropriation)

Location	Actual 1982		Estimated 1983		Estimated 1984	
	Dollars	Staff-Years	Dollars	Staff-Years	Dollars	Staff-Years
ALABAMA, Auburn.....	2,272,826	50	2,409,400	51	2,457,800	51
ALASKA, Palmer.....	712,012	7	731,500	7	738,800	7
ARIZONA						
Phoenix.....	4,001,435	96	4,480,600	98	4,532,600	98
Tucson.....	3,084,338	76	3,327,200	80	3,365,800	80
Total....	7,085,773	172	7,807,800	178	7,898,400	178
ARKANSAS						
Booneville.....	858,445	7	944,600	11	958,100	11
Stuttgart.....	238,472	3	222,600	4	225,800	4
Total....	1,096,917	10	1,167,200	15	1,183,900	15
CALIFORNIA						
Albany.....	18,581,140	375	19,135,100	375	20,953,100	384
Brawley.....	299,292	10	355,500	10	360,800	10
Davis.....	1,666,999	22	1,282,800	23	1,302,200	23
Fresno.....	2,653,727	62	2,895,300	62	2,939,400	62
Indio.....	176,699	5	- -	- -	- -	- -
Pasadena.....	1,212,960	21	1,380,100	22	1,401,000	22
Riverside.....	2,391,456	58	2,859,100	65	2,902,400	65
Salinas.....	1,802,901	34	1,361,500	34	1,382,100	34
San Francisco.....	1,763,885	10	3,046,900	17	3,322,600	17
Shafter.....	1,029,389	19	1,008,700	23	1,024,000	23
Total....	31,578,448	616	33,325,000	631	35,587,600	640
COLORADO						
Akron.....	458,835	10	631,600	14	641,400	14
Denver.....	2,082,596	44	1,982,200	44	2,012,900	44
Fort Collins.....	5,044,272	101	5,667,000	109	5,754,900	109
Total....	7,585,703	155	8,280,800	167	8,409,200	167
DELAWARE						
Georgetown.....	426,307	9	358,700	9	363,900	9
Newark.....	466,297	14	423,000	13	429,200	13
Total....	892,604	23	781,700	22	793,100	22
DISTRICT OF COLUMBIA						
Program.....	2,952,944	78	2,611,000	79	2,617,400	79
Headquarters						
Agency Management Services.....	22,121,372	578	21,900,000	563	21,015,000	549
Centrally Financed Program...	11,789,488	- -	10,454,700	- -	10,454,700	- -
Subtotal...	33,910,860	578	32,354,700	563	31,469,700	549
Total.....	36,863,804	656	34,965,700	642	34,087,100	628

STATEMENT OF OBLIGATIONS AND STAFF-YEARS BY LOCATION

Location	Actual 1982		Estimated 1983		Estimate 1984	
	Dollars	Staff-Years	Dollars	Staff-Years	Dollars	Staff-Years
FLORIDA						
Belle Glade.....	236,080	4	190,000	5	192,700	5
Brooksville.....	223,868	4	208,500	4	211,500	4
Canal Point.....	745,618	22	734,700	21	745,100	21
Fort Lauderdale.....	323,215	8	527,300	9	534,800	9
Gainesville.....	7,003,164	139	7,486,800	143	7,856,800	143
Lake Alfred.....	123,380	3	130,900	3	132,700	3
Miami.....	920,654	22	1,014,100	24	1,028,500	24
Orlando.....	2,432,984	60	2,540,900	61	2,576,900	61
Winter Haven.....	773,335	17	806,500	17	817,900	17
Total....	12,782,298	279	13,639,700	287	14,096,900	287
GEORGIA						
Athens.....	8,129,440	206	8,386,700	208	8,512,500	208
Byron.....	1,718,177	39	1,579,100	40	1,602,800	40
Dawson.....	977,192	24	1,020,200	25	1,035,500	25
Experiment.....	265,406	5	316,500	4	321,100	4
Savannah.....	2,136,041	60	2,287,400	60	2,585,700	60
Tifton.....	5,384,585	112	5,809,500	112	5,896,700	112
Watkinsville.....	1,202,217	28	1,559,000	27	1,582,400	27
Total....	19,813,058	474	20,958,400	476	21,536,700	476
HAWAII, Honolulu.....						
	2,272,339	40	2,006,000	40	2,037,200	40
IDAHO						
Aberdeen.....	378,375	6	457,100	6	463,300	6
Boise.....	800,007	16	894,000	18	906,100	18
Dubois.....	996,592	14	893,200	18	905,300	18
Kimberly (Twin Falls).....	1,849,540	45	2,214,700	46	2,244,600	46
Total....	4,024,514	81	4,459,000	88	4,519,300	88
ILLINOIS						
Chicago.....	136,442	3	158,300	3	161,000	3
Peoria.....	18,064,879	360	21,516,000	360	22,917,100	368
Urbana.....	2,494,632	44	2,780,200	44	2,827,300	44
Total....	20,695,953	407	24,454,500	407	25,905,400	415
INDIANA						
Lafayette.....	2,391,128	31	2,652,400	30	2,691,000	30
Vincennes.....	359,511	8	340,500	8	345,400	8
Total....	2,750,639	39	2,992,900	38	3,036,400	38

STATEMENT OF OBLIGATIONS AND STAFF-YEARS BY LOCATION

Location	Actual 1982		Estimated 1983		Estimated 1984	
	Dollars	Staff-Years	Dollars	Staff-Years	Dollars	Staff-Years
IOWA						
Ames.....	14,190,441	290	13,612,200	296	13,973,400	296
Ankeny.....	401,658	9	442,500	9	447,100	9
Total.....	14,592,099	299	14,054,700	305	14,420,500	305
KANSAS, Manhattan.....	3,125,002	69	3,337,300	71	3,391,000	71
KENTUCKY, Lexington...	884,874	24	887,100	24	895,900	24
LOUISIANA						
Baton Rouge.....	1,175,285	28	1,370,700	29	1,389,500	29
Houma.....	1,251,310	30	1,300,200	33	1,318,100	33
Lake Charles.....	337,720	6	348,000	7	352,800	7
New Orleans.....	21,146,613	392	22,234,200	397	23,115,700	397
Total.....	23,910,928	456	25,253,100	466	26,176,100	466
MAINE, Orono.....	473,851	8	580,500	9	593,300	9
MARYLAND						
Beltsville.....	61,264,594	1,394	70,951,500	1,320	73,373,400	1,379
Frederick.....	1,810,776	35	1,945,100	34	1,975,700	34
Glenn Dale.....	292,031	10	412,100	10	418,600	10
Hyattsville.....	334,444	11	356,000	12	361,600	12
Total.....	63,701,845	1,450	73,664,700	1,376	76,129,300	1,435
MASSACHUSETTS						
Boston.....	4,985,831	3	3,537,600	3	3,803,700	3
Otis AFB.....	189,373	2	228,900	2	230,100	2
Total.....	5,175,204	5	3,766,500	5	4,033,800	5
MICHIGAN, East Lansing	2,699,554	58	2,895,700	58	3,150,700	58
MINNESOTA						
East Grand Forks....	390,355	9	369,100	9	375,900	9
Minneapolis.....	182,225	4	235,800	3	240,200	3
Morris.....	1,254,244	29	1,283,500	30	1,307,400	30
St. Paul.....	2,318,211	39	2,192,400	38	2,233,400	38
Total.....	4,145,035	81	4,080,800	80	4,156,900	80
MISSISSIPPI						
Gulfport.....	158,446	4	254,100	5	257,800	5
Meridian.....	301,391	10	356,100	10	361,300	10
Mississippi State...	4,427,255	99	4,843,600	105	4,914,600	105
Oxford.....	2,015,767	52	2,590,900	58	2,628,900	58
Poplarville.....	291,527	6	282,600	6	286,800	6
Stoneville.....	6,314,837	173	6,499,900	161	6,595,200	161
Total.....	13,509,223	344	14,827,200	345	15,044,600	345

STATEMENT OF OBLIGATIONS AND STAFF-YEARS BY LOCATION

Location	Actual 1982		Estimated 1983		Estimated 1984	
	Dollars	Staff-Years	Dollars	Staff-Years	Dollars	Staff-Years
MISSOURI, Columbia...	3,666,931	87	3,872,300	88	3,931,800	88
MONTANA						
Bozeman.....	758,785	16	831,100	16	846,500	16
Miles City.....	1,146,577	11	1,154,600	11	1,176,000	11
Sidney.....	812,978	23	898,200	23	914,800	23
Total....	2,718,340	50	2,883,900	50	2,937,300	50
NEBRASKA						
Clay Center.....	7,063,054	56	6,589,900	56	6,664,900	56
Lincoln.....	2,214,791	32	2,552,300	35	2,581,400	35
Total....	9,277,845	88	9,142,200	91	9,246,300	91
NEVADA, Reno.....	673,045	11	525,900	13	533,600	13
NEW JERSEY						
New Brunswick.....	297,010	7	308,700	7	318,100	7
NEW MEXICO						
Las Cruces.....	1,847,347	29	1,031,200	28	1,048,600	28
NEW YORK						
Geneva.....	217,432	5	269,600	5	272,900	5
Ithaca.....	2,707,483	38	2,451,400	38	2,481,700	38
Plum Island.....	12,882,543	303	12,236,100	290	12,387,100	290
Total....	15,807,458	346	14,957,100	333	15,141,700	333
NORTH CAROLINA						
Oxford.....	1,510,392	37	1,496,100	36	1,515,300	36
Raleigh.....	3,320,702	51	3,566,500	53	3,612,300	53
Total....	4,831,094	88	5,062,600	89	5,127,600	89
NORTH DAKOTA						
Fargo.....	5,698,622	119	6,192,800	118	6,277,800	118
Grand Forks.....	3,342,404	29	3,361,400	32	3,646,400	32
Mandan.....	2,069,984	49	2,135,700	47	2,165,000	47
Total....	11,111,010	197	11,689,900	197	12,089,200	197
OHIO						
Columbus.....	113,268	2	193,500	2	196,800	2
Coshocton.....	797,116	16	820,300	17	834,200	17
Delaware.....	499,452	11	578,300	11	588,100	11
Wooster.....	1,399,210	37	1,427,100	34	1,451,200	34
Total....	2,809,046	66	3,019,200	64	3,070,300	64
OKLAHOMA						
Durant.....	1,600,571	42	1,831,600	45	1,861,500	45
El Reno.....	1,256,850	19	1,318,100	19	1,339,600	19
Stillwater.....	1,192,635	22	1,350,600	24	1,372,700	24
Woodward.....	726,023	16	713,400	15	725,000	15
Total....	4,776,079	99	5,213,700	103	5,298,800	103

STATEMENT OF OBLIGATIONS AND STAFF-YEARS BY LOCATION

Location	Actual 1982		Estimated 1983		Estimated 1984	
	Dollars	Staff-Years	Dollars	Staff-Years	Dollars	Staff-Years
OREGON						
Burns.....	174,927	1	217,800	2	220,500	2
Corvallis.....	2,164,032	42	2,360,100	41	2,389,500	41
Pendleton.....	881,398	21	942,300	16	954,000	16
Total.....	3,220,357	64	3,520,200	59	3,564,000	59
PENNSYLVANIA						
University Park.....	2,338,570	51	2,422,700	51	2,478,500	51
Wyndmoor.....	12,781,954	307	12,592,900	288	12,882,800	288
Total.....	15,120,524	358	15,015,600	339	15,361,300	339
SOUTH CAROLINA						
Charleston.....	1,739,034	43	1,620,200	43	1,642,000	43
Clemson.....	1,809,170	33	2,106,000	34	2,134,300	34
Florence.....	1,563,530	39	1,617,900	39	1,639,700	39
Total.....	5,111,734	115	5,344,100	116	5,416,000	116
SOUTH DAKOTA						
Brookings-Madison...	1,474,782	34	1,409,500	35	1,433,100	35
TENNESSEE						
Greenville.....	21,503	1	52,500	1	53,600	1
Jackson.....	109,242	3	113,400	3	115,700	3
Knoxville.....	452,390	10	484,900	12	494,800	12
Lewisburg.....	134,294	4	148,800	4	151,900	4
Total.....	717,429	18	799,600	20	816,000	20
TEXAS						
Beaumont.....	657,115	17	694,000	17	706,700	17
Brownsville.....	1,361,998	29	1,230,000	29	1,252,600	29
Brownwood.....	462,220	11	406,500	13	414,000	13
Bushland.....	2,014,547	35	2,257,800	41	2,299,300	41
College Station.....	6,528,656	128	5,971,900	135	6,213,600	135
Houston.....	2,888,231	3	2,975,800	4	3,294,500	4
Kerrville.....	2,491,281	61	2,596,100	61	2,643,800	61
Lubbock.....	1,715,776	28	1,882,100	34	1,916,700	34
Mission.....	869,171	14	--	--	--	--
Temple.....	2,146,563	44	2,559,400	44	2,606,400	44
Weslaco.....	3,793,766	90	3,752,200	93	3,821,100	93
Total.....	24,929,324	460	24,325,800	471	25,168,700	471
UTAH, Logan.....	2,658,157	59	2,948,200	59	3,008,400	59

STATEMENT OF OBLIGATIONS AND STAFF-YEARS BY LOCATION

Location	Actual 1982		Estimated 1983		Estimated 1984	
	Dollars	Staff-Years	Dollars	Staff-Years	Dollars	Staff-Years
VIRGINIA						
Richmond.....	195,280	5	191,500	5	194,100	5
Suffolk (Holland).....	479,028	9	459,100	12	465,400	12
Total.....	674,308	14	650,600	17	659,500	17
WASHINGTON						
Prosser.....	1,523,046	38	1,668,500	39	1,698,000	39
Pullman.....	3,342,604	72	4,109,400	74	4,182,100	74
Wenatchee.....	1,189,144	21	1,197,500	18	1,218,600	18
Yakima.....	1,861,229	40	1,869,800	33	1,902,900	33
Total.....	7,916,023	171	8,845,200	164	9,001,600	164
WEST VIRGINIA						
Beckley.....	1,342,365	20	1,810,500	21	1,849,900	21
Kearneysville.....	1,615,601	21	2,344,000	21	2,395,000	21
Total.....	2,957,966	41	4,154,500	42	4,244,900	42
WISCONSIN, Madison.....	3,375,231	40	4,451,200	45	4,514,700	45
WYOMING						
Cheyenne.....	459,245	18	431,400	15	435,100	15
Laramie.....	290,356	7	300,100	9	302,700	9
Total.....	749,601	25	731,500	24	737,800	24
PUERTO RICO						
Mauvaguez.....	1,121,236	32	1,152,000	32	1,169,200	32
Rio Piedras.....	361,635	8	388,500	8	394,300	8
Total.....	1,482,871	40	1,540,500	40	1,563,500	40
VIRGIN ISLANDS						
St. Croix.....	300,629	11	188,000	6	190,700	6
OTHER COUNTRIES						
Argentina, Buenos Aires.	145,153	--	158,600	1	158,700	1
France, Sevres.....	568,856	1	519,700	10	520,100	10
Guatemala, Guatemala....	49,506	1	--	--	--	--
Italy, Rome.....	400,934	2	365,800	9	366,100	9
Japan, Sapporo.....	38,422	--	--	--	--	--
Kenya, Murgu.....	170,639	1	185,700	2	185,800	2
Korea, Seoul.....	130,582	1	98,500	3	98,600	3
Mexico, Tuxtla Gutierrez	--	--	925,600	15	926,300	15
Netherlands, Rotterdam..	247,920	1	342,300	5	342,600	5
Thailand, Chiang Mai....	187,787	--	--	--	--	--
Total.....	1,939,799	7	2,596,200	45	2,598,200	45

STATEMENT OF OBLIGATIONS AND STAFF-YEARS BY LOCATION

Location	Actual 1982		Estimated 1983		Estimated 1984	
	Dollars	Staff-Years	Dollars	Staff-Years	Dollars	Staff-Years
Extramural and Program locations to be determined.....	3,509,790	--	12,182,400	--	12,622,400	--
Contingency Research Fund.....	<u>a/</u>	--	1,000,000	--	1,000,000	--
Construction of Facilities.....	--	--	--	--	--	--
Repair & Maintenance of Facilities and Equipment.....	<u>b/</u>	--	8,504,000	--	8,504,000	--
Energy Retrofit.....	<u>b/</u>	--	2,588,000	--	2,588,000	--
Unobligated Balance.....	5,294,133	--	--	--	--	--
Subtotal, Available or Estimate.....	421,892,366	8,328	459,829,000	8,341	472,016,000	8,341
Allotment to Forest Service.....	+346,634	1	+393,000	1	+394,000	1
Transfers from: Statistical Reporting Service.....	-190,000	--	-190,000	--	--	--
Office of Minority Affairs.....	-70,000	--	-70,000	--	--	--
Transfers to: Human Nutrition Information Service.....	+8,732,000	--	--	--	--	--
Office of the Secretary.....	+445,000	--	+454,000	--	--	--
Office of Information Resources Management.....	+404,000	--	+404,000	--	--	--
Reductions for: Standard Level User Changes.....	+2,694,000	--	--	--	--	--
Advisory Committees.....	+156,000	--	--	--	--	--
Supplemental for Pay Costs..	--	--	-6,442,000	--	--	--
Total, Available or Estimated.....	434,410,000c/	8,329	454,378,000	8,342	472,410,000	8,342

a/ Obligations for the \$1,000,000 appropriated in 1982 are included in the locations above.

b/ Obligations for repair and maintenance \$8,386,540, and energy retrofit \$2,587,687, in 1982 are included in the locations above.

c/ Includes \$2,000,000 for Special Fund.

AGRICULTURAL RESEARCH SERVICE

The estimates include proposed changes in the Language of this item as follows:
(deleted matter enclosed in brackets).

Building and Facilities

[For acquisition of land, construction, repair, improvement, extension, alteration, and purchase of fixed equipment or facilities of or used by the Agricultural Research Service, where not otherwise provided, \$1,927,000.]

The change proposes deletion of language authorizing acquisitions of land, construction, repair, improvement, extension, alteration and purchases of fixed equipment or facilities at Lincoln, Nebraska; Oklahoma; and Corvallis, Oregon. Language for these activities will not be required in FY 1984.

Status of Construction Projects as of January 1983 (Cont.)

Location and Purpose	Year	Funds Provided Amount	Description
New York, Plum Island Additional Animal Laboratory Facilities	1973	Plans.....\$ 250,000	Construction of the laboratory additions was halted in March 1979 due to contractor default. The entire project consists of completing the Vaccine Storage Warehouse, Entry and Change Facility, Animal Facility, and the Diagnostic Research Laboratory and mothballing the Vaccine Research Laboratory. A contract was awarded in the second quarter of fiscal year 1980 for construction management services for the assessment and for the design and construction of the laboratory additions. Preliminary mothballing of critical systems for the protection against environmental conditions at the Vaccine Research Laboratory occurred in fiscal year 1980. The assessment of in-place construction and the construction of the Vaccine Storage Warehouse was completed in the fourth quarter of fiscal year 1981. Construction of the Entry and Change Facility was awarded in the third quarter of fiscal year 1982 and is projected to be completed in the second quarter of fiscal year 1983. Construction of the initial phase of the Animal Facility was awarded in the fourth quarter of fiscal year 1982 and is projected to be completed in the third quarter of fiscal year 1983. Design of the remaining phases on the Animal Facility and the Diagnostic Research Laboratory was awarded in the second quarter of fiscal year 1982. Design is approximately 95 percent complete and is projected to be completed in the second quarter of fiscal year 1983. A construction contract for the remaining phases is expected to be awarded in the third quarter of fiscal year 1983 and is projected to be completed in the fourth quarter of fiscal year 1984. Design for the completion of mothballing requirements at the Vaccine Research Laboratory is deferred until the construction contracts for the Animal Facility and the Diagnostic Research Laboratory are awarded in fiscal year 1983.
	1976	Construction... 10,000,000	
	1977	Redirection.... 294,000 c/	
	1977	Redirection.... 700,000 d/	
	1978	Redirection.... 900,000 e/	
	1981	Construction... 10,100,000	
	Total.....	22,244,000	

Status of Construction Projects as of January 1983 (Cont.)

<u>Location and Purpose</u>	<u>Year</u>	<u>Funds Provided Amount</u>	<u>Description</u>
<u>North Dakota, Grand Forks</u> <u>Human Nutrition Research</u>	1976 Plans.....	\$ 225,000	AE contract was awarded in the fourth quarter of fiscal year 1978. Architect's design was completed in the third quarter of fiscal year 1979. Invitation of construction bids resulted in all bids exceeding funds available. Architect's redesign of a building of reduced scope was completed in the third quarter of fiscal year 1980. Construction contract was awarded in the fourth quarter of fiscal year 1980. Construction completion and occupancy of the facility occurred in the fourth quarter of fiscal year 1982.
	1977 Redirection....	76,514 f/	
	1978 Construction...	3,500,000	
	1980 Redirection....	389,000 g/	
	1981 Redirection....	786,000 h/	
	1982 Construction... Total.....	2,000,000 6,976,514	
<u>Oklahoma</u> <u>Small Farm Experiment</u> <u>and Demonstration</u> <u>Station</u>	1983 Plans.....	350,000	Design work will commence in the third quarter of fiscal year 1983.
	1978 Construction... 1979 Construction... 1980 Construction... Total	1,500,000 1/ 300,000 1,000,000 2,800,000	Construction contract was awarded in the first quarter of fiscal year 1980. Construction completion and occupancy of the facility occurred in the third quarter of fiscal year 1982.
<u>Oklahoma, Stillwater</u> <u>Headhouse/greenhouse</u>	1979 Plans.....	170,000	AE contract was awarded in the fourth quarter of fiscal year 1979. Architect's design was completed in the third quarter of fiscal year 1980. Construction contract was awarded in the fourth quarter of fiscal year 1980. Construction completion and occupancy of the facility occurred in the second quarter of fiscal year 1982.
	1980 Construction...	1,700,000	
	1981 Construction... Total.....	1,000,000 2,870,000	
<u>Oregon, Corvallis</u> <u>National Forage Seed</u> <u>Production Research</u> <u>Center</u>	1983 Plans.....	750,000	Design work will commence in the third quarter of fiscal year 1983.
	1978 Feasibility Study.....	100,000	AE contract for design criteria document was awarded in the second quarter of fiscal year 1980 and completed in the fourth quarter of fiscal year 1980. The design contract for the central laboratory was awarded in the fourth quarter of fiscal year 1980. AE design of the central laboratory was completed in the first quarter of fiscal year 1982.
<u>Texas, Lubbock</u> <u>Plant and Moisture</u> <u>Stress Laboratory</u>	1979 Plans.....	800,000	
	Total.....	900,000	

Status of Construction Projects as of January 1983 (Cont.)

<u>Location and Purpose</u>	<u>Years</u>	<u>Funds Provided Amount</u>	<u>Description</u>
Texas, Mission <u>Fever Tick Research</u>	1982 Planning and Construction	\$ 700,000	Design was completed in the third quarter of fiscal year 1982. Construction of fiscal year awarded in the fourth quarter of fiscal year 1982. Construction completion is projected to be in the fourth quarter of fiscal year 1983.
West Virginia, Beckley <u>Soil and Water Conservation Research</u>	1972 Plans..... 1973 Construction... 1976 Redirection.... 1977 Redirection.... 1981 Construction... Total.....	70,000 700,000 40,000 j/ 1,509,000 d/ 1,000,000 3,319,000	Construction contract was awarded in the third quarter of fiscal year 1978. Construction completion was in the second quarter of fiscal year 1980. Additional funds in fiscal year 1981 were provided to construct facilities to protect research equipment. Construction contract was awarded in the first quarter of fiscal year 1982 and is projected to be completed in the second quarter of fiscal year 1983.
West Virginia, Kearneysville <u>Fruit Crops Research</u>	1973 Plans..... 1976 Construction... 1977 Redirection.... Total.....	200,000 7,570,000 -2,209,000 d/ 5,561,000	AE contract was awarded in the first quarter of fiscal year 1974. Architect's design was completed in the fourth quarter of fiscal year 1976. Construction contract was awarded in the second quarter of fiscal year 1977. Construction contract was completed in the fourth quarter of fiscal year 1979. (Beneficial occupancy of facility was in May 1978.) Award of contract is projected in fiscal year 1983 for the purchase and installation of scientific research equipment.

Status of Construction Projects as of January 1983 (Cont.)

Location and Purpose	Years	Funds Provided Amount	Description
Wisconsin, Madison Dairy Forage Research Center	1978 Plans..... 1979 Construction... Total.....	\$1,100,000 9,000,000 <u>10,100,000</u>	This facility is located on Baraboo field site (military base). At contract was awarded in the fourth quarter of fiscal year 1978. Architect's design was completed in the third quarter of fiscal year 1979. Construction contract was awarded in the fourth quarter of fiscal year 1979. Construction was completed in the fourth quarter of fiscal year 1980. Construction contract was awarded in the first quarter of fiscal year 1982 for additional support facilities. Construction completion and occupancy of the facilities occurred in the fourth quarter of fiscal year 1982.
			University of Wisconsin campus site: drawing received the first quarter of fiscal year 1979. Architect's design was completed in the fourth quarter of fiscal year 1979. Construction contract awarded in the first quarter of fiscal year 1980. Construction and occupancy of the facility were completed in the third quarter of fiscal year 1981.

AGRICULTURAL RESEARCH SERVICE

Passenger Motor Vehicles

The 1984 Budget Estimate does not include the purchase of additional passenger motor vehicles above the 472 passenger motor vehicles presently owned.

The passenger motor vehicles of this Agency are used by research scientists and staff personnel in the course of their daily work. These vehicles are operated chiefly at field stations engaged in research, and are used for travel where common carriers are seldom feasible. This involves travel to individual farms, ranches, commercial firms, cooperating experiment stations, etc. The vehicles are essential for collecting experimental data and materials necessary for research work.

It is the policy of ARS to fully utilize motor vehicles to keep the number of vehicles to a minimum and reduce overall costs for maintenance.

Replacement of passenger motor vehicles. Replacement would be made of 118 of the 472 passenger motor vehicles (including 8 buses) operated at field stations engaged in research. It is estimated that all of the 118 passenger vehicles to be replaced will have mileage of more than 60,000 or be 7 or more years old.

Age and Mileage Data for passenger-carrying vehicles on hand as of September 30, 1982.

<u>Age-Year Model</u>	<u>Number of Vehicles*</u>	<u>Percent of Total</u>	<u>Lifetime Mileage (thousands)</u>	<u>Number of Vehicles*</u>	<u>Percent of Total</u>
1977+	227	48	80-over	23	5
1978	66	14	60-80	127	27
1979	39	8	40-60	111	24
1980	69	15	20-40	138	29
1981	37	8	Under 20	73	15
1982	<u>34</u>	<u>7</u>	<u>- -</u>	<u>- -</u>	<u>- -</u>
Total....	472	100		472	100

* Includes 6 vehicles used in foreign countries, and 8 buses.

Aircraft

There will not be any additional acquisitions to any of the seven aircraft owned by ARS in FY 1984. These aircraft are located at College Station, Texas; Weslaco, Texas; and Yakima, Washington. They are used in control methods, application of agricultural materials, and infrared and color photography, and evaluating efficiency affects on weather conditions.

COOPERATIVE STATE RESEARCH SERVICE

Purpose Statement

Cooperative State Research Service participates in a nationwide system of agricultural research program planning and coordination between the States and the U.S. Department of Agriculture which encourages and assists in the establishment and maintenance of cooperation within and among the States and between the States and their Federal research partners. The primary function is the administration of grants and payments to States to supplement State and local funding for agricultural research carried on by the State agricultural experiment stations of the 50 States, Puerto Rico, Guam, the Virgin Islands, the District of Columbia, American Samoa, Micronesia, and Northern Mariana Islands; by approved schools of forestry; the 1890 land-grant institutions and Tuskegee Institute; colleges of veterinary medicine; and other eligible institutions.

The program coordination and planning is carried out by a Cooperative State Research Service staff located entirely in the Washington, D. C. area. As of September 30, 1982, there were 138 full-time employees and 5 other employees.

COOPERATIVE STATE RESEARCH SERVICE

Available Funds and Staff-Years

1982 Actual and Estimated, 1983 and 1984

Item	1982		1983		1984	
	Actual	Staff:	Estimated	Staff:	Estimated	Staff
	Amount	Years	Amount	Years	Amount	Years
Cooperative State Research Service ...	:220,639,000:	135	:244,949,000:	101	:231,715,000:	101
<u>Obligations under other USDA</u>	:	:	:	:	:	:
<u>appropriations:</u>	:	:	:	:	:	:
Office of International Cooperation	:	:	:	:	:	:
and Development:	:	:	:	:	:	:
Research program with Tunisia ...	: 4,489:	- -	- -	- -	- -	- -
Bioenergy systems and technology.	: 31,213:	- -	: 10,530:	- -	- -	- -
Various research agencies sharing	:	:	:	:	:	:
cost of Current Research	:	:	:	:	:	:
Information System (CRIS)	: 389,400:	8	: 425,000:	5	: 467,500:	5
Total, Other USDA Appropriations.	: 425,102:	8	: 435,530:	5	: 467,500:	5
Total, Agriculture	:	:	:	:	:	:
Appropriations	:221,064,102:	143	:245,384,530:	106	:232,182,500:	106
<u>Other Federal Funds:</u>	:	:	:	:	:	:
AID-PASA, Symbiotic nitrogen fixation:	: 482,143:	- -	: 600,000:	- -	: 600,000:	- -
Department of Energy:	:	:	:	:	:	:
Analysis of repository siting	: 534,000:	- -	: 500,000:	- -	: 500,000:	- -
Energy integrated farm system	: 61,234:	- -	: 67,297:	- -	- -	- -
National Institute of Mental Health,	:	:	:	:	:	:
Health services profile	: 67,000:	- -	- -	- -	- -	- -
Forest Service:	:	:	:	:	:	:
Forest research	: 544,135:	- -	: 475,000:	- -	: 475,000:	- -
Atmospheric deposition	: 36,000:	- -	: 36,000:	- -	: 36,000:	- -
Printing publication	: 3,405:	- -	- -	- -	- -	- -
Department of Army, guayule project.	: 300,000:	- -	: 300,000:	- -	: 300,000:	- -
Miscellaneous reimbursements	: -	- -	: 373,673:	- -	: 387,800:	- -
Total, Other Federal Funds	: 2,027,917:	- -	: 2,351,970:	- -	: 2,298,800:	- -
<u>Non-Federal Funds:</u>	:	:	:	:	:	:
State Agricultural Experiment	:	:	:	:	:	:
Stations and 1890 Institutions,	:	:	:	:	:	:
Sharing cost of Current Research	:	:	:	:	:	:
Information System (CRIS)	: 194,700:	4	: 212,500:	3	: 233,700:	3
Total, Cooperative State Research	:	:	:	:	:	:
Service	:223,286,719:	147	:247,949,000:	109	:234,715,000:	109

	1982	1983	1984
	Actual	Estimated	Estimated
Full-Time Equivalent Staff-Years:			
Ceiling	146	108	108
Non-ceiling	1	1	1
Total	147	109	109

COOPERATIVE STATE RESEARCH SERVICE

Permanent Positions by Grade and Staff-Year Summary

1982 and Estimated 1983 and 1984

Grade	1982		1983		1984	
	:Headquarters/Total	::Headquarters/Total	:Headquarters/Total	::Headquarters/Total	:Headquarters/Total	::Headquarters/Total
ES-6	1	::	1	::	1	::
ES-4	3	::	3	::	3	::
GS/GM-15	36	::	33	::	33	::
GS/GM-14	7	::	6	::	6	::
GS/GM-13	12	::	11	::	11	::
GS-12	7	::	7	::	7	::
GS-11	10	::	9	::	9	::
GS-9	9	::	3	::	3	::
GS-8	1	::	1	::	1	::
GS-7	16	::	10	::	10	::
GS-6	25	::	18	::	18	::
GS-5	13	::	10	::	10	::
GS-4	9	::	7	::	7	::
GS-3	1	::	-	::	-	::
Other Graded Positions.....	-	::	-	::	-	::
Ungraded Positions..	-	::	-	::	-	::
Total Permanent Positions.....	150	::	119	::	119	::
Staff-years:		::		::		::
Ceiling.....	146	::	108	::	108	::
Non-Ceiling.....	1	::	1	::	1	::
Total.....	147	::	109	::	109	::

COOPERATIVE STATE RESEARCH SERVICE

CLASSIFICATION BY OBJECTS

1982 and Estimated 1983 and 1984

	<u>1982</u>	<u>1983</u>	<u>1984</u>
Personnel Compensation:			
Headquarters.....	\$4,137,258	\$3,895,000	\$3,668,000
Field.....	<u>- -</u>	<u>- -</u>	<u>- -</u>
11 Total Personnel Compensation.....	4,137,258	3,895,000	3,668,000
12 Personnel Benefits	386,243	398,000	389,000
13 Benefits for former personnel	<u>- -</u>	<u>334,000</u>	<u>113,000</u>
Total Pers. Comp. & Benefits.....	4,523,501	4,627,000	4,170,000
Other Objects:			
21 Travel.....	386,706	401,000	401,000
22 Transportation of things.....	6,579	8,000	9,000
23.2 Communications, utilities and other rent.....	832,817	944,000	973,000
24 Printing and reproduction.....	127,864	148,000	161,000
25 Other services.....	1,617,155	1,755,000	1,861,000
26 Supplies and materials.....	80,687	49,000	54,000
31 Equipment.....	45,903	51,000	112,000
41 Grants, subsidies and contributions....	<u>210,833,295</u>	<u>236,966,000</u>	<u>223,974,000</u>
Total Other Objects ..	<u>213,931,006</u>	<u>240,322,000</u>	<u>227,545,000</u>
Total direct obligations	<u>218,454,507</u>	<u>244,949,000</u>	<u>231,715,000</u>
<u>Position Data:</u>			
Average Salary, ES positions.....	\$58,500	\$64,650	\$64,650
Average Salary, GS positions.....	\$29,944	\$33,449	\$33,449
Average Grade, GS positions.....	9.88	10.40	10.40

COOPERATIVE STATE RESEARCH SERVICE

The estimates include appropriation language for this item as follows (new language underscored; deleted matter enclosed in brackets):

Cooperative State Research Service

- For payments to agricultural experiment stations, for cooperative forestry and other research, for facilities, and for other expenses, including \$149,295,000 to carry into effect the provisions of the Hatch Act, approved March 2, 1887, as amended by the Act approved August 11, 1955 (7 U.S.C. 361a-361i), and further amended by Public Law 92-318 approved June 23, 1972, and further amended by Public Law 93-471 approved October 26, 1974, including administration by the United States Department of Agriculture, and penalty mail costs of agricultural experiment stations under section 6 of the Hatch Act of 1887, as amended, and payments under section 1361(c) of the Act of October 3, 1980 (7 U.S.C. 301n.); \$12,452,000 for grants for cooperative forestry research under the Act approved October 10, 1962 (16 U.S.C. 582a--582a-7), as amended by Public Law 92-318 approved June 23, 1972, including administrative expenses, and payments under section 1361(c) of the Act of October 3, 1980 (7 U.S.C. 301n.); \$22,394,000 for payments to the 1890 land-grant colleges, including Tuskegee Institute, for research under section 1445 of the National Agricultural Research, Extension, and Teaching Policy Act of 1977 (Public Law 95-113), as amended, including administration by the United States Department of Agriculture, and penalty mail costs of the 1890 land-grant colleges, including Tuskegee Institute; [~~\$26,533,000~~] \$15,482,000 for contracts and grants for agricultural research under the Act of August 4, 1965, as amended (7 U.S.C. 450i); [~~\$17,000,000~~] \$21,500,000 for competitive research grants, including administrative expenses; [~~\$5,760,000~~] \$1,740,000 for the support of animal health and disease programs authorized by section 1433 of Public Law 95-113, including administrative expenses; \$540,000 for grants in accordance with section 1419 of Public Law 95-113, as amended; \$702,000 for research authorized by the Native Latex Commercialization and Economic Development Act of 1978;] \$10,000,000 for grants to upgrade 1890 land-grant college research facilities as authorized by section 1433 of Public Law 97-98; and [~~\$290,000~~] \$592,000 for necessary expenses of Cooperative State Research Service activities, including administration of payments to State agricultural experiment stations, funds for employment pursuant to the second sentence of section 706(a) of the Organic Act of 1944 (7 U.S.C. 2225), and not to exceed \$50,000 for employment under 5 U.S.C. 3109; in all, [~~\$244,966,000~~] \$231,715,000.
- 1

This change deletes language for animal health and disease research program authorized by section 1433 of Public Law 95-113, alcohol fuels research authorized by section 1419 of Public Law 95-113, and research authorized by the Native Latex Commercialization and Economic Development Act of 1978. No funding is proposed for these programs in fiscal year 1984.

COOPERATIVE STATE RESEARCH SERVICE

Appropriation Act, 1983	\$244,966,000
Budget Estimate, 1984	231,715,000
Decrease in Appropriation	<u>-13,251,000</u>

Adjustments in 1983

Appropriation Act, 1983	\$244,966,000	
Transfer to Office of the Secretary a/	<u>-17,000</u>	
Adjusted base for 1983		244,949,000
Budget estimate, 1984		231,715,000
Decrease over adjusted 1983		<u>-13,234,000</u>

a/ Pursuant to Section 1414, Public Law 97-98, an Assistant Secretary, Science and Education has been established. Actual transfer of funds of \$17,000 are anticipated in 1983. On a comparable basis the full annual cost of the activity including pay costs is \$17,000 for 1983 and 1984.

SUMMARY OF INCREASES AND DECREASES
(On basis of adjusted appropriation)

<u>Item of Change</u>	<u>1983 Estimated</u>	<u>Program Changes</u>	<u>1984 Estimated</u>
Payments under the Hatch Act	\$149,295,000	- -	\$149,295,000
Cooperative forestry research	12,452,000	- -	12,452,000
Payments to 1890 colleges and Tuskegee Institute	22,394,000	- -	22,394,000
Special research grants	27,775,000	-\$12,293,000	15,482,000
Competitive research grants	17,000,000	+4,500,000	21,500,000
Animal health and disease research, section 1433	5,760,000	-5,760,000	- -
Federal administration (direct appropriation)	273,000	+319,000	592,000
1890 Research Facilities	<u>10,000,000</u>	<u>- -</u>	<u>10,000,000</u>
TOTAL AVAILABLE	<u>244,949,000</u>	<u>-13,234,000</u> a/	<u>231,715,000</u>

a/ Includes a total increase of \$249,000 for the portion of pay increases effective in FY 1983 which was absorbed in FY 1983 which is needed to carry out the programs proposed in FY 1984.

PROJECT STATEMENT
(On basis of adjusted appropriation)

Project	1982 Actual		1983 Estimated		Increase or Decrease	1984 Estimated	
	Amount	Staff: Years	Amount	Staff: Years		Amount	Staff: Years
1. Hatch Act:							
Research program:							
Formula funds	\$102,810,680	- -	\$110,099,228	- -	- -	\$110,099,228	- -
Regional research.	32,395,770	- -	34,490,813	- -	- -	34,490,813	- -
Subtotal	135,206,450	- -	144,590,041	- -	- -	144,590,041	- -
Penalty Mail	475,987	- -	476,000	- -	- -	476,000	- -
Federal Admin. (3%)	3,908,937	76	4,228,959	58	- -	4,228,959	60
Total	139,591,374	76	149,295,000	58	- -	149,295,000	60
2. Cooperative forestry research:							
Research program ..	11,670,070	- -	12,078,440	- -	- -	12,078,440	- -
Federal Admin. (3%)	360,930	7	373,560	5	- -	373,560	5
Total	12,031,000	7	12,452,000	5	- -	12,452,000	5
3. Payments to 1890 colleges and Tuskegee Institute:							
Research program ..	20,180,373	- -	21,722,180	- -	- -	21,722,180	- -
Federal Admin. (3%)	644,760	11	671,820	9	- -	671,820	9
Total	20,825,133	11	22,394,000	9	- -	22,394,000	9
4. Special research grants:							
Soil erosion in							
Pacific Northwest.	622,000		622,000		-\$622,000	- -	
Dried bean research,							
North Dakota	24,000		25,000		-25,000	- -	
Food and agriculture							
policies	156,000		156,000		-156,000	- -	
Soybean research ..	518,000		518,000		-518,000	- -	
Integ. pest manage-							
ment (consortium).	3,091,000		3,091,000		-3,091,000	- -	
Biological control							
of pests	480,000		480,000		-480,000	- -	
Pesticide clearance	1,440,000		1,440,000		- -	1,440,000	
Minor use animal							
drugs	240,000		240,000		- -	240,000	
Pesticide impact							
assessment	2,069,000		2,069,000		- -	2,069,000	
Rural development							
centers	311,000		311,000		-311,000	- -	
Soybean cyst nema-							
tode, Missouri ...	240,000		300,000		-300,000	- -	
Bean and beet re-							
search, Michigan .	82,000		97,000		-97,000	- -	
Animal health							
research	7,156,000		7,156,000		- -	7,156,000	
Energy research ...	960,000		- -		- -	- -	
Aquaculture, Stone-							
ville, Mississippi	240,000		270,000		-270,000	- -	
Dairy photoperiod							
research, Michigan	34,000		34,000		-34,000	- -	
Bean flour research,							
Texas/Michigan ...	99,000		99,000		-99,000	- -	
Aquaculture research	518,000		518,000		-518,000	- -	
Antidesertification	1,037,000		1,037,000		-1,037,000	- -	
Germplasm resources	902,000		902,000		- -	902,000	
Peach tree short							
life, South Carolina	192,000		192,000		-192,000	- -	
Blueberry shoestring							
virus, Michigan ..	96,000		96,000		-96,000	- -	
Food quality and							
safety research...	384,000		384,000		-384,000	- -	
Control of perennial							
weeds, Stoneville,							
Mississippi	144,000		- -		- -	- -	
Mosquito research,							
riceland agroeco-							
system	480,000		480,000		-480,000	- -	

Project	1982 Actual		1983 Estimated		Increase or Decrease	1984 Estimated	
	Amount	Staff: Years	Amount	Staff: Years		Amount	Staff: Years
Small farm research center study,							
Oklahoma	\$24,000		- -		- -	- -	
TCK smut (wheat) ..	288,000		\$361,000		-\$361,000	- -	
Sunflower midge,							
North Dakota	72,000		80,000		-80,000	- -	
Tropical & sub-tropical research.	- -		2,980,000		- -	\$2,980,000	
Dairy goat research,							
Prairie View A&M,							
Texas	- -		100,000		-100,000	- -	
Acid precipitation.	- -		695,000		- -	695,000	
Sugarland use							
research, Hawaii ..	- -		150,000		-150,000	- -	
Stocker cattle							
research, Oklahoma	- -		140,000		-140,000	- -	
Agronomic and horti-							
cultural studies,							
Oklahoma	- -		110,000		-110,000	- -	
Potato research,							
Eastern Russet							
breeding program ..	- -		200,000		-200,000	- -	
Biomass energy							
research, Oregon ..	- -		1,200,000		-1,200,000	- -	
Federal Admin. (3%)	(656,970)	19	(795,990)	11	(-331,530)	(464,460)	11
Total	21,899,000	19	26,533,000	11	-11,051,000	15,482,000	11
Alcohol fuels re-							
search (Section							
1419, PL 95-113):							
Research program ..	523,800		523,800		-523,800	- -	
Federal Admin. (3%)	16,200		16,200		-16,200	- -	
Total	540,000		540,000		-540,000	- -	- -
Native Latex Act:							
Research program ..	680,940		680,940		-680,940	- -	
Federal Admin. (3%)	21,060		21,060		-21,060	- -	
Total	702,000		702,000		-702,000	- -	
	23,141,000	19	27,775,000	11	-12,293,000(1)	15,482,000	11
5.Competitive research							
grants:							
Plant science.....	13,440,000	- -	15,000,000	- -	- -	15,000,000	- -
Human nutrition ...	2,880,000	- -	2,000,000	- -	- -	2,000,000	- -
Animal science	- -	- -	- -	- -	+4,500,000	4,500,000	- -
Federal Admin. (3%)	(489,600)	19	(510,000)	16	(+135,000)	(645,000)	16
Total	16,320,000	19	17,000,000	16	+4,500,000(2)	21,500,000	16
6.Animal health and							
disease research,							
section 1433:							
Research program ..	5,529,600	- -	5,529,600	- -	-5,529,600	- -	- -
Federal Admin. (4%)	230,400	3	230,400	2	-230,400	- -	- -
Total	5,760,000	3	5,760,000	2	-5,760,000(3)	- -	- -
7.Federal administra-							
tion (direct appro.)	786,000	- -	273,000	- -	+319,000(4)	592,000	- -
8.1890 Research							
Facilities:							
Research program ..	- -	- -	9,600,000	- -	- -	9,600,000	- -
Federal Admin. (4%)	- -	- -	400,000	- -	- -	400,000	- -
Total	- -	- -	10,000,000	- -	- -	10,000,000	- -
Unobligated balance ..	2,184,493	- -	- -	- -	- -	- -	- -
Total available or							
estimate	220,639,000	135	244,949,000	101	-13,234,000	231,715,000	101
Transfer to Office of							
the Secretary	+16,000		+17,000				
SLUC and Advisory							
Committees	+561,000						
Total, appropriation .	221,216,000	135	244,966,000				

EXPLANATION OF PROGRAM

The Agriculture, Rural Development, and Related Agencies Appropriations Act of 1983 funds Cooperative State Research Service activities authorized under the following Acts:

1. Payments to agricultural experiment stations under the Hatch Act, and for penalty mail - Agricultural Experiment Stations Act of August 11, 1955, Hatch Act of 1887 as amended - 7 U.S.C. 361a-361i; Education Amendments of 1972, Public Law 92-318, June 23, 1972; Public Law 93-471, October 26, 1974; Public Law 95-113, September 29, 1977, as amended; Public Law 96-374, October 3, 1980; Public Law 97-98, December 22, 1981.

Funds under the Hatch Act are allocated to the State agricultural experiment stations of the 50 States, District of Columbia, Puerto Rico, Guam, the Virgin Islands, Micronesia, and American Samoa for research to promote a sound and prosperous agriculture and rural life. The Hatch Act provides that the distribution of Federal payments to States for fiscal year 1955 shall become a fixed base and that any sums appropriated in excess of the 1955 level shall be distributed in the following manner:

- 20% shall be allotted equally to each State.
- not less than 52% shall be allotted to the States as follows:
 - one-half in an amount proportionate to the relative rural population of each State to the total rural population of all States, and
 - one-half in an amount proportionate to the relative farm population of each State to the total farm population of all States.
- not more than 25% shall be allotted to the States for cooperative research in which two or more State agricultural experiment stations are cooperating to solve problems that concern the agriculture of more than one State.
- 3% shall be available to the Secretary of Agriculture for the administration of this Act.

The Act also provides that any amount in excess of \$90,000 available for allotment to any State, exclusive of the regional research fund, shall be matched by the State out of its own funds for research, and for the establishment and maintenance of facilities necessary for the performance of such research.

The Hatch Act provides for the mailing under penalty indicia by agricultural experiment stations of bulletins, reports, periodicals, reprints of articles, and other publications, including lists of publications necessary for dissemination of results of research. Mailings include not only those to individual farmers upon request but also to newspapers, libraries, other experiment stations, and organizations interested in results of research and dissemination of such results. Under Title 39 U.S.C. 3206(b) and 3203(a)(4), the Department paid to the U.S. Postal Service \$475,987 to cover postage of mail sent under the penalty privilege by the State agricultural experiment stations during fiscal year 1982. Funds of \$476,000 have been set-aside from the fiscal year 1983 appropriation and the fiscal year 1984 budget under the Hatch Act for payments to the U.S. Postal Service.

Three percent of funds appropriated under the Hatch Act is set-aside for Federal administration. Administration includes disbursement of funds and a continuous review and evaluation of the research programs of the State agricultural experiment stations supported wholly or in part from Hatch funds. Cooperative State Research Service encourages and assists in the establishment of cooperation within and between the States, and also actively participates in the planning and coordination of research programs between the States and the Department at the regional and national level.

2. Cooperative Forestry Research - The Cooperative Forestry Research Act of October 10, 1962, 16 U.S.C. 582a-7; Education Amendments of 1972, Public Law 92-318, June 23, 1972; Public Law 96-374, October 3, 1980; Public Law 97-98, December 22, 1981.

The Act authorizes funding of research in State institutions certified by a State representative designated by the governor of each State. The Act provides that appropriated funds be apportioned among States as determined by the Secretary after consultation with a national advisory council of not fewer than sixteen members representing Federal and State agencies concerned with developing and utilizing the Nation's forest resources, the forest industries, the forestry schools of the State-certified eligible institutions, State agricultural experiment stations, and volunteer public groups concerned with forests and related natural resources. Determination of apportionments follows consideration of pertinent factors including areas of non-Federal commercial forest land, volume of timber cut from growing stock, and the non-Federal dollars expended on forestry research in the State. The Act also provides that payments must be matched by funds made available and budgeted from non-Federal sources by the certified institutions for expenditure for forestry research. Three percent of funds appropriated under this Act is set-aside for Federal administration.

3. Payments to 1890 Colleges and Tuskegee Institute - The National Agricultural Research, Extension, and Teaching Policy Act of 1977, Section 1445, Public Law 95-113, September 29, 1977; Public Law 95-547, October 28, 1978; Public Law 97-98, December 22, 1981.

Public Law 95-113, as amended, provides for support of continuing agricultural research at colleges eligible to receive funds under the Act of August 30, 1890, including Tuskegee Institute. Beginning with fiscal year 1979, there shall be appropriated funds for each fiscal year, an amount not less than 15% of the total for such year under Section 3 of the Act of March 2, 1887. Distribution of payments made available under section 2, Act of August 4, 1965, for fiscal year 1978 are a fixed base and sums in excess of the 1978 level shall be distributed as follows:

- 3% shall be available to the Secretary of Agriculture.
- Payments to States in fiscal year 1978 is a fixed base. Of funds in excess of this amount:
 - 20% shall be allotted equally to each State.
 - 40% shall be allotted in an amount proportionate to the rural population of the State in which the eligible institution is located to the total rural population of all the States in which eligible institutions are located, and
 - 40% shall be allotted in an amount proportionate to the farm population of the State in which the eligible institution is located to the total farm population of all the States in which eligible institutions are located.

Allotments to Tuskegee Institute and Alabama A&M University shall be determined as if each institution were in a separate State. Three percent of the funds appropriated under this Act is set aside for Federal administration. This includes disbursements of funds and review and evaluation of proposals.

4. Special Research Grants - Section 2(c), Act of August 4, 1965, 7 U.S.C. 450i as amended by Public Law 95-113, September 29, 1977; Section 1419, Public Law 95-113, as amended by Public Law 96-294, June 30, 1980; Public Law 97-98, December 22, 1981; and Public Law 95-592, November 4, 1978.

Section 2 of the Act of August 4, 1965, as amended, authorizes Special Research Grants for periods not to exceed five years to land-grant colleges and universities, State agricultural experiment stations, research foundations established by land-grant colleges and universities, and to all colleges

and universities having a demonstrable capacity in food and agricultural research to further the programs of the Department of Agriculture. Special Research Grants are awarded on the discretionary basis as well as using a competitive peer panel process in the selection of proposals to be funded.

In addition Alcohol Fuels Research grants are awarded in accordance with Section 1419 of Public Law 95-113, as amended by Public Law 96-294, June 30, 1980. Research grants are also awarded under the Native Latex Commercialization and Economic Development Act of 1978, Public Law 95-592.

5. Competitive Research Grants - Section 2(b), Act of August 4, 1965, 7 U.S.C. 450i as amended by Public Law 95-113, September 29, 1977; Public Law 97-98, December 22, 1981.

Section 2 of the Act of August 4, 1965 as amended, authorizes Competitive Grants for periods not to exceed five years to State Agricultural Experiment Stations, all Colleges and Universities, other research institutions and organizations, Federal agencies, private organizations or corporations and individuals to further the programs of the Department of Agriculture. By obtaining the participation of outstanding researchers in the entire U.S. scientific community, emphasis will be placed on basic research critical to food production and human nutrition including biological stress of plants, genetic mechanisms of plants, plant nitrogen fixation, plant photosynthesis, animal science, and human nutrient requirements.

6. Animal Health and Disease Research - The National Agricultural Research, Extension, and Teaching Policy Act of 1977, Section 1433, Public Law 95-113, September 29, 1977; Public Law 97-98, December 22, 1981.

Section 1433 provides for support of livestock and poultry disease research in colleges of veterinary medicine and in eligible State agricultural experiment stations. These funds shall be distributed as follows:

- 4% shall be retained by the Department of Agriculture for administration, program assistance to the eligible institutions, and program coordination.
 - 48% shall be distributed in an amount proportionate to the value of and income to producers from domestic livestock and poultry in each State to the total value of and income to producers from domestic livestock and poultry in all the States.
 - 48% shall be distributed in an amount proportionate to the animal health research capacity of the eligible institutions in each State to the total animal health research capacity in all the States.
- Eligible institutions must provide non-Federal matching funds in States receiving annual amounts in excess of \$100,000 under this authorization.
7. Federal Administration (direct appropriation) - Authority for direct appropriations is provided in the annual Agriculture, Rural Development, and Related Agencies Appropriations Act. These funds are used to provide support services in connection with research planning and coordination of all programs administered by Cooperative State Research Service.
 8. Grants to Upgrade 1890 Land-Grant College Research Facilities. National Agricultural Research, Extension, and Teaching Policy Act Amendments of 1981, Section 1433, Public Law 97-98, December 22, 1981.

Section 1433 of the Act authorizes funds for grants to the institutions eligible to receive funds under the Act of August 30, 1890, including Tuskegee Institute, for the acquisition and improvement of research facilities and equipment. Four percent of the sums appropriated shall be available to the Secretary for administration of the grant program. The remaining funds shall be available for grants to the eligible institutions for the purpose of assisting them in the purchase of equipment and land, and the planning, construction, alteration, or renovation of buildings to strengthen their capacity to conduct research in the food and agricultural sciences.

JUSTIFICATION OF INCREASES AND DECREASES

- (1) A decrease of \$12,293,000 for Special Research Grants, Alcohol Fuels, and Native Latex Act as follows: (\$27,775,000 available in FY 1983).

Soil erosion in Pacific Northwest	\$622,000
Dried bean research, North Dakota	25,000
Food and agriculture policies	156,000
Soybean research	518,000
Integrated pest management (consortium)	3,091,000
Biological control of pests	480,000
Rural development centers	311,000
Soybean cyst nematode, Missouri	300,000
Bean and beet research, Michigan	97,000
Aquaculture, Stoneville, Mississippi	270,000
Dairy photoperiod research, Michigan	34,000
Bean flour research, Texas and Michigan	99,000
Aquaculture research	518,000
Antidesertification research	1,037,000
Peach tree short life, South Carolina.....	192,000
Blueberry shoestring virus, Michigan.....	96,000
Food quality and safety research	384,000
Mosquito research, Riceland agroecosystem.....	480,000
TCK smut (wheat).....	361,000
Sunflower midge, North Dakota.....	80,000
Dairy goat research, Prairie View A&M, Texas ..	100,000
Sugarland use research, Hawaii	150,000
Stocker cattle research, Oklahoma	140,000
Agronomic & horticultural studies, Oklahoma ...	110,000
Potato research, Eastern russet breeding	200,000
Biomass energy research, Oregon	1,200,000
Total	<u>11,051,000</u>

Alcohol Fuels Research Grants, Section 1419, Public Law 95-113	540,000
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Native Latex Commercialization and Economic Development Act of 1978	<u>702,000</u>
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12,293,000

Need for Change. This decrease realigns the research effort of this grant program at this time. Prior funding under this program has already directed attention to these areas and the research grants funded in fiscal year 1983 and prior years will be used over a period of up to five years for completion of studies. The level of funding and the time period of support provided by these grants will yield important information. As results of this research become known, an assessment can be made of the need for augmenting this base of scientific knowledge developed by these programs.

Nature of Change. This change will terminate special research grant funding of the specific areas of research identified above. Amounts allotted to the States on a formula basis permit State institutions to fund research in those areas that they identify as high priority and could be a possible source of funding for these programs if the States wish to continue the research.

- (2) An increase of \$4,500,000 for Competitive Research Grants (\$17,000,000 available in FY 1983).

Need for Change. Additional funding will allow a new animal science program area to be initiated. The inclusion of animal science will broaden the range of research covered by the Competitive Research Grants program and increase the impact of the program.

The importance of animals to this Nation's agriculture and to consumer well-being provides compelling justification for research addressing the critical issues and opportunities facing the animal industries. Animals not only provide a significant contribution to the agricultural income of the United States but more than half of the protein, one-third of the energy, most of the calcium and phosphorus, and many of the needed vitamins in the American diet.

This increase will provide expansion of basic research in animal science to assure an expanded fundamental knowledge base for efficient and adequate production of animal products and assure that adequate supplies of these food products continue to be available.

The Policy Advisory Committee for Science and Education Grants Programs recommended in 1982 that basic animal research be included in the Competitive Research Grants program. The Experiment Station Committee on Organization and Policy in their fiscal year 1984 budget recommendations to the Cooperative State Research Service on increases for research also proposed that animal science research be included under the Competitive Research Grants program. The Conference on Animal Agriculture Research to Meet the Needs of the 21st Century held in Michigan in 1980 pointed up the major areas in which research needs to be done, stating:

"Reproductive inefficiency is one of the most costly and production-limiting problems facing the animal industry. Reproduction can be influenced by genetics, management, nutrition, disease, and environment. Although problems are different in each species, the greatest opportunity to improve reproduction efficiency of farm animals lies in development of basic information that will permit us to control or alter specific reproductive events and reduce postnatal losses."

Nature of Change. Research will be supported on basic physiological mechanisms involved in animal reproduction to identify processes influencing reproductive efficiency. These areas include problems in the understanding of the mechanics and chemistry of gametogenesis and gamete physiology, the genetic basis for reproductive efficiency, problems concerned with fertilization, and an understanding of the hormonal mechanisms involved in these processes.

- (3) A decrease of \$5,760,000 for Animal Health and Disease Research, Sec. 1433, P.L. 95-113 (\$5,760,000 available in FY 1983).

Need for Change. Seventy-eight institutions are currently eligible to receive payments under formula provisions of this program first funded in FY 1979. The level of appropriated Federal funds has not been adequate to support a viable program across the eligible institutions. Animal health and disease research will continue to be conducted by Federal and State research institutions under other authorizations which provide opportunity for more concentrated efforts in solving a limited number of high priority problems of national significance.

Nature of Change. This portion of the animal health and disease research program is proposed for elimination. Ongoing Federal and State research programs will sustain the overall animal health and disease research efforts in many of the high priority areas. The competitively awarded Animal Health Special Research Grants will be targeted on areas of major national concern. Research initiated under the Section 1433 formula can be continued by the States as part of their ongoing programs if they so desire.

- (4) An increase of \$319,000 for Federal Administration (direct appropriation) (\$273,000 available in FY 1983).
- (a) An increase of \$249,000 for annualization of pay that was absorbed in fiscal year 1983 that is necessary to carry out the program in fiscal year 1984.
- (b) An increase of \$70,000 to initiate a program of agricultural research in the Northern Mariana Islands.

Need for Change. Public Law 96-597, Sec. 601(c), authorizes the Secretary of Agriculture to extend, at his discretion, programs administered by the Department of Agriculture to the Northern Mariana Islands. The increase will allow development and initiation of a program of agricultural research in the Northern Mariana Islands.

Nature of Change. This amount will initiate an agricultural research program on a limited scale in the Commonwealth, in conjunction with a similar initiative on Extension programs by the Extension Service. The initial research program will address selected agricultural production and marketing problems.

COOPERATIVE STATE RESEARCH SERVICE

STATUS OF PROGRAM

The funds appropriated for Cooperative State Research Service provide the Federal Government's support for land-grant agricultural experiment stations, approved schools of forestry, the 1890 land-grant institutions and Tuskegee Institute, Colleges of Veterinary Medicine and other eligible institutions in the various States and in Puerto Rico, Guam, the Virgin Islands, the District of Columbia, American Samoa, Micronesia, and Northern Mariana Islands.

The State institutions conduct research and experiments on the problems continuously encountered in the development of a permanent and sustaining agriculture and forestry, and in the improvement of the economic and social welfare of rural and urban families. Because of differences in climate, soil, market outlets, and other local conditions, each State has distinct problems in the production and marketing of crops and livestock. Farmers, foresters, and rural people in the individual States naturally look to their State agricultural experiment stations, universities, and colleges for solution of the State and local problems and request services to help meet changing conditions.

Research programs at State institutions, to be most effective, include participation in regional and national programs. Joint effort by a group of State institutions is the most effective and often the only practical approach to problems of common interest. The stations are acting together as regional groups to provide cooperative coordinated attacks on problems of regional and national interest. In a similar manner, the research programs of the State institutions and the Department of Agriculture are complementary and interdependent.

The Federal formula funds constitute a powerful force in bringing about inter-State cooperation and Federal-State collaboration in the planning and conduct of this overall program of agricultural research. Therefore, the impact of the Federal formula funds cannot be fully evaluated solely on the basis of the amount of funds provided.

Research at the State institutions is organized into a program of projects that is submitted for approval by the Cooperative State Research Service. The program of projects is financed wholly or in part from Federal formula and grant funds. Programs and projects are evaluated periodically with station scientists by administrators and technical staff of the Cooperative State Research Service. The evaluation includes consideration of quality and productivity of the program and projects. The continuing process of research evaluation by station scientists and the staff of the Cooperative State Research Service results in a dynamic program with approximately 15 to 20 percent of the projects being replaced by new and/or revised projects each year.

TABLE 1
DISTRIBUTION OF FEDERAL PAYMENTS TO STATES FOR RESEARCH AT STATE AGRICULTURAL EXPERIMENT
STATIONS AND OTHER STATE INSTITUTIONS - FISCAL YEAR 1982

STATE	HATCH ACT, AS AMENDED				COOP. FORESTRY RESEARCH (M-S)	1890 COLLEGES & TUSKEGEE INSTITUTE	ANIMAL HEALTH & DISEASE RESEARCH	SPECIAL GRANTS	COMPETITIVE GRANTS	FEDERAL ADMIN. (DIRECT APPRO.)	TOTAL FEDERAL FUNDS
	REGULAR FORMULA	REGIONAL RESEARCH	TOTAL								
ALABAMA.....	2,471,586	666,422	3,138,008		383,053	2,494,254	131,640	312,289	50,000	...	6,509,244
ALASKA.....	667,491	112,813	780,304		207,680	...	12,503	5,000	...	...	1,005,487
AMERICAN SAMOA.....	169,090	...	169,090		...	...	...	...	...	...	169,090
ARIZONA.....	913,937	596,496	1,510,433		185,758	...	60,007	865,118	184,000	...	2,805,316
ARKANSAS.....	2,108,050	584,055	2,692,105		361,131	1,083,707	81,957	515,863	...	...	4,734,763
CALIFORNIA.....	2,686,597	1,261,763	3,948,360		390,360	...	380,956	1,731,746	2,085,000	...	8,536,422
COLORADO.....	1,223,229	823,961	2,047,190		163,837	...	276,285	515,066	270,000	...	3,272,378
CONNECTICUT.....	1,039,471	397,076	1,436,547		127,301	...	20,041	5,638	...	...	1,589,527
DELAWARE.....	717,660	293,749	1,011,409		68,843	433,427	17,041	105,000	...	...	1,635,720
DISTRICT OF COLUMBIA.....	163,080	46,619	209,699		...	...	...	...	655,100	...	864,799
FLORIDA.....	1,700,457	529,768	2,230,225		302,674	852,410	98,128	526,098	475,000	...	4,484,535
GEORGIA.....	2,717,838	835,685	3,553,523		397,667	1,353,215	164,797	218,460	190,000	...	5,877,662
GUAM.....	541,119	92,807	633,926		...	...	...	5,000	...	...	638,926
HAWAII.....	712,479	302,331	1,014,810		98,072	...	8,341	5,645	...	...	1,126,868
IDAHO.....	1,139,818	470,287	1,610,105		273,445	...	85,447	336,301	...	...	2,305,298
ILLINOIS.....	3,383,104	791,032	4,174,136		200,372	...	167,905	390,613	1,140,700	...	6,073,726
INDIANA.....	3,075,768	714,331	3,790,099		214,987	...	120,908	443,870	408,200	...	4,978,064
IOWA.....	3,200,669	1,117,838	4,318,507		119,994	...	332,041	930,457	110,000	...	5,810,999
KANSAS.....	1,984,110	661,914	2,646,024		105,379	...	185,103	111,473	315,000	...	3,362,979
KENTUCKY.....	3,155,090	664,053	3,819,143		251,523	1,509,786	93,303	361,964	210,000	...	6,245,719
LOUISIANA.....	1,954,815	551,295	2,506,110		353,824	994,522	111,591	217,002	81,300	...	4,264,349
MAINE.....	1,013,434	409,283	1,422,717		339,210	...	24,622	183,860	...	...	1,970,409
MARYLAND.....	1,400,361	546,983	1,947,344		171,144	724,119	65,425	85,799	305,000	...	3,298,831
MASSACHUSETTS.....	1,226,151	502,692	1,728,843		149,222	...	53,013	75,257	1,004,800	...	3,011,135
MICHIGAN.....	3,127,614	701,981	3,829,595		346,517	...	116,077	1,094,943	570,000	...	5,957,132
MICRONESIA.....	185,000	...	185,000		...	...	...	...	...	...	185,000
MINNESOTA.....	3,034,096	731,574	3,765,670		288,059	...	201,032	213,384	787,400	...	5,255,545
MISSISSIPPI.....	2,589,054	783,550	3,372,604		368,439	1,042,297	76,879	611,918	130,000	...	5,602,137
MISSOURI.....	2,928,335	624,964	3,553,299		236,909	1,394,864	169,597	533,351	432,000	...	6,320,020
MONTANA.....	1,083,226	526,693	1,609,919		244,216	...	89,650	127,422	...	...	2,071,207
NEBRASKA.....	1,826,826	709,201	2,536,027		83,458	...	184,801	333,142	270,000	...	3,407,428
NEVADA.....	657,820	288,377	946,197		76,150	...	23,947	71,283	...	...	1,117,577
NEW HAMPSHIRE.....	814,601	294,364	1,108,965		193,066	...	12,753	99,680	...	...	1,414,464
NEW JERSEY.....	1,205,027	795,300	2,000,327		141,916	...	27,466	502,657	285,000	...	2,957,366
NEW MEXICO.....	946,779	317,285	1,264,064		156,530	...	43,831	160,795	100,000	...	1,725,220
NEW YORK.....	3,027,791	1,208,472	4,236,263		324,595	...	232,443	952,499	1,749,600	...	7,495,400

STATE	HATCH ACT, AS AMENDED				COOP. FORESTRY RESEARCH (M-S)	1890 COLLEGES & TUSKEGEE INSTITUTE	ANIMAL HEALTH & DISEASE RESEARCH	SPECIAL GRANTS	COMPETITIVE GRANTS	FEDERAL ADMIN. (DIRECT APPRO.)	TOTAL FEDERAL FUNDS
	REGULAR FORMULA	REGIONAL RESEARCH	TOTAL								
NORTH CAROLINA.....	4,155,906	955,641	5,111,547	375,746	1,864,704	101,339	385,506	255,600	...	...	8,094,442
NORTH DAKOTA.....	1,371,677	470,929	1,842,606	61,536	...	57,879	100,894	103,000	...	...	2,165,915
OHIO.....	3,694,214	758,139	4,452,353	229,602	...	135,595	1,016,641	569,700	...	...	6,403,891
OKLAHOMA.....	1,900,624	479,224	2,379,848	200,373	973,233	130,813	31,875	167,000	...	...	3,883,142
OREGON.....	1,420,580	745,973	2,166,553	412,282	...	114,941	817,576	454,000	...	...	3,965,352
PENNSYLVANIA.....	3,704,880	967,898	4,672,778	295,366	...	160,651	630,467	225,000	...	...	5,984,262
PUERTO RICO.....	2,860,285	593,415	3,453,700	...	...	16,008	5,320	...	...	...	3,475,028
RHODE ISLAND.....	664,935	304,811	969,746	54,229	...	12,658	5,000	35,000	...	...	1,076,633
SOUTH CAROLINA.....	2,152,081	550,359	2,702,440	309,981	835,132	23,241	240,593	55,000	...	...	4,166,387
SOUTH DAKOTA.....	1,403,403	474,940	1,878,343	90,765	...	109,615	189,799	89,000	...	...	2,357,522
TENNESSEE.....	3,071,382	682,333	3,753,715	266,138	1,437,220	73,990	373,923	211,000	...	...	6,115,986
TEXAS.....	3,910,664	970,617	4,881,281	317,288	1,880,435	343,157	4,234,308	197,000	...	...	11,853,469
UTAH.....	831,703	543,615	1,375,318	134,608	...	61,031	39,030	310,000	...	...	1,919,987
VERMONT.....	866,087	255,008	1,121,095	207,680	...	17,148	111,855	...	...	...	1,457,778
VIRGIN ISLANDS.....	268,667	95,471	364,138	...	...	...	5,000	...	...	...	369,138
VIRGINIA.....	2,623,471	628,402	3,251,873	331,902	1,277,848	86,636	78,002	330,000	...	...	5,356,261
WASHINGTON.....	1,623,207	1,059,555	2,682,762	404,975	...	138,166	867,128	617,000	...	...	4,710,031
WEST VIRGINIA.....	1,671,460	428,948	2,100,408	258,830	...	18,317	5,000	...	...	...	2,382,555
WISCONSIN.....	3,044,690	840,751	3,885,441	280,752	...	215,841	655,260	404,000	...	...	5,441,294
WYOMING.....	779,191	452,227	1,231,418	112,686	...	43,044	5,000	...	...	...	1,392,148
OTHER.....	...	165,500	165,500	...	29,200	...	...	...	...	...	194,700
SUBTOTAL.....	102,810,680	32,378,770	135,189,450	11,670,070	20,180,373	5,529,600	22,446,770	15,830,400	...	...	210,846,663
COMMITTEE OF NINE.....	...	17,000	17,000	...	...	...	...	...	...	...	17,000
UNOBLIGATED BALANCE.....	1,394,628	48,543	1,443,171	...	666,867	...	...	...	...	...	2,110,038
FEDERAL ADMINISTRATION.....	104,205,308	32,444,313	136,649,621	11,670,070	20,847,240	5,529,600	22,446,770	15,830,400	...	...	212,973,701
UNOBLIGATED BALANCE.....	...	...	3,908,937	360,930	644,760	230,400	694,230	489,600	1,363,000	...	7,691,857
PENALTY MAIL.....	...	...	...	...	...	...	...	...	...	...	74,442
UNOBLIGATED BALANCE.....	...	...	3,983,379	360,930	644,760	230,400	694,230	489,600	1,363,000	...	7,766,299
SUBTOTAL.....	...	...	475,987	...	...	...	...	...	...	...	475,987
PENALTY MAIL.....	...	...	...	...	...	...	...	...	...	...	13
UNOBLIGATED BALANCE.....	...	...	...	...	...	...	...	...	...	...	475,987
SUBTOTAL.....	...	...	476,000	...	...	...	...	...	...	...	476,000
TOTAL.....	104,205,308	32,444,313	141,109,000	12,031,000	21,492,000	5,760,000	23,141,000	16,320,000	1,363,000	...	221,216,000

Table 2
Hatch Act Payments to State Agricultural Experiment Stations
(In Dollars)

	FY 1982 Actual			FY 1983 Estimate			FY 1984 Est
	Regular	Regional		Regular	Regional		Regular
	Formula	Research	Total	Formula	Research	Total	Formula
Alabama	\$2,471,586:	\$666,422:	\$3,138,008:	\$2,585,729:	\$705,087:	\$3,290,816:	\$2,575,366
Alaska	667,491:	112,813:	780,304:	700,508:	119,734:	820,242:	697,701
American Samoa:	169,090:	- - :	169,090:	584,294:	- - :	584,294:	581,952
Arizona	913,937:	596,496:	1,510,433:	962,431:	633,095:	1,595,526:	958,574
Arkansas	2,108,050:	584,055:	2,692,105:	2,212,310:	617,941:	2,830,251:	2,203,444
California	2,686,597:	1,261,763:	3,948,360:	2,853,566:	1,340,793:	4,194,359:	2,842,129
Colorado	1,223,229:	823,961:	2,047,190:	1,291,627:	878,279:	2,169,906:	1,286,450
Connecticut ...	1,039,471:	397,076:	1,436,547:	1,091,947:	413,055:	1,505,002:	1,087,571
Delaware	717,660:	293,749:	1,011,409:	755,818:	308,983:	1,064,801:	752,789
Dist. of Col. :	163,080:	46,619:	209,699:	465,167:	89,204:	554,371:	463,302
Florida	1,700,457:	529,768:	2,230,225:	1,799,136:	560,504:	2,359,640:	1,791,926
Georgia	2,717,838:	835,685:	3,553,523:	2,862,357:	892,368:	3,754,725:	2,850,884
Guam	541,119:	92,807:	633,926:	604,145:	102,522:	706,667:	601,724
Hawaii	712,479:	302,331:	1,014,810:	755,734:	321,038:	1,076,772:	752,706
Idaho	1,139,818:	470,287:	1,610,105:	1,212,087:	499,142:	1,711,229:	1,207,229
Illinois	3,383,104:	791,032:	4,174,136:	3,612,517:	834,052:	4,446,569:	3,598,038
Indiana	3,075,768:	714,331:	3,790,099:	3,272,704:	702,938:	3,975,642:	3,259,587
Iowa	3,200,669:	1,117,838:	4,318,507:	3,375,287:	1,230,619:	4,605,906:	3,361,759
Kansas	1,984,110:	661,914:	2,646,024:	2,099,539:	697,263:	2,796,802:	2,091,125
Kentucky	3,155,090:	664,053:	3,819,143:	3,325,509:	706,077:	4,031,586:	3,312,180
Louisiana	1,954,815:	551,295:	2,506,110:	2,051,559:	583,281:	2,634,840:	2,043,336
Maine	1,013,434:	409,283:	1,422,717:	1,066,249:	430,508:	1,496,757:	1,061,976
Maryland	1,400,361:	546,983:	1,947,344:	1,471,124:	588,690:	2,059,814:	1,465,228
Massachusetts :	1,226,151:	502,692:	1,728,843:	1,289,572:	528,762:	1,818,334:	1,284,403
Michigan	3,127,614:	701,981:	3,829,595:	3,299,106:	740,158:	4,039,264:	3,285,883
Micronesia	185,000:	- - :	185,000:	611,215:	- - :	611,215:	608,765
Minnesota	3,034,096:	731,574:	3,765,670:	3,229,559:	784,620:	4,014,179:	3,216,615
Mississippi ...	2,589,054:	783,550:	3,372,604:	2,687,084:	789,579:	3,476,663:	2,676,314
Missouri	2,928,335:	624,964:	3,553,299:	3,117,482:	658,952:	3,776,434:	3,104,987
Montana	1,083,226:	526,693:	1,609,919:	1,144,264:	559,009:	1,703,273:	1,139,678
Nebraska	1,826,826:	709,201:	2,536,027:	1,937,617:	747,771:	2,685,388:	1,929,851
Nevada	657,820:	288,377:	946,197:	692,158:	306,071:	998,229:	689,384
New Hampshire :	814,601:	294,364:	1,108,965:	859,947:	309,630:	1,169,577:	856,500
New Jersey	1,205,027:	795,300:	2,000,327:	1,268,463:	852,624:	2,121,087:	1,263,379
New Mexico	946,779:	317,285:	1,264,064:	992,419:	336,753:	1,329,172:	988,442
New York	3,027,791:	1,208,472:	4,236,263:	3,199,745:	1,306,183:	4,505,928:	3,186,920
North Carolina:	4,155,906:	955,641:	5,111,547:	4,357,271:	1,011,086:	5,368,357:	4,339,807
North Dakota ..	1,371,677:	470,929:	1,842,606:	1,447,837:	496,540:	1,944,377:	1,442,034
Ohio	3,694,214:	758,139:	4,452,353:	3,893,294:	799,370:	4,692,664:	3,877,689
Oklahoma	1,900,624:	479,224:	2,379,848:	2,018,247:	507,029:	2,525,276:	2,010,158
Oregon	1,420,580:	745,973:	2,166,553:	1,501,847:	791,743:	2,293,590:	1,495,828
Pennsylvania ..	3,704,880:	967,898:	4,672,778:	3,918,138:	1,018,094:	4,936,232:	3,902,434
Puerto Rico ...	2,860,285:	593,415:	3,453,700:	2,972,015:	627,844:	3,599,859:	2,960,103
Rhode Island ..	664,935:	304,811:	969,746:	697,810:	320,619:	1,018,429:	695,013
South Carolina:	2,152,081:	550,359:	2,702,440:	2,249,693:	582,291:	2,831,984:	2,240,676
South Dakota ..	1,403,403:	474,940:	1,878,343:	1,481,236:	500,770:	1,982,006:	1,475,299
Tennessee	3,071,382:	682,333:	3,753,715:	3,225,979:	721,922:	3,947,901:	3,213,049
Texas	3,910,664:	970,617:	4,881,281:	4,142,043:	1,026,931:	5,168,974:	4,125,442
Utah	831,703:	543,615:	1,375,318:	875,033:	576,970:	1,452,003:	871,526
Vermont	866,087:	255,008:	1,121,095:	914,840:	273,116:	1,187,956:	911,173
Virgin Islands:	268,667:	95,471:	364,138:	590,453:	101,009:	691,462:	588,086
Virginia	2,623,471:	628,402:	3,251,873:	2,755,941:	660,524:	3,416,465:	2,744,895
Washington	1,623,207:	1,059,555:	2,682,762:	1,711,210:	1,114,268:	2,825,478:	1,704,350
West Virginia :	1,671,460:	428,948:	2,100,408:	1,752,537:	451,193:	2,203,730:	1,745,512
Wisconsin	3,044,690:	840,751:	3,885,441:	3,213,277:	869,867:	4,083,144:	3,200,397
Wyoming	779,191:	452,227:	1,231,418:	820,354:	493,010:	1,313,364:	817,065
Other	- - :	182,500:	182,500:	- - :	180,600:	180,600:	- -
SUBTOTAL ..	102,810,680:	32,395,770:	135,206,450:	109,879,030:	34,300,081:	144,179,111:	109,438,633
Regional Res.-:	:	:	:	:	:	:	:
undistributed:	- - :	- - :	- - :	- - :	121,750:	121,750:	34,283,868
Federal Admin.:	- - :	- - :	3,908,937:	- - :	- - :	4,220,501:	4,203,585
Penalty Mail ..	- - :	- - :	475,987:	- - :	- - :	475,048:	473,144
Unoblig. Bal. :	1,394,628:	48,453:	1,517,626:	- - :	- - :	- - :	- -
Small Business:	:	:	:	:	:	:	:
Act	- - :	- - :	- - :	220,198:	68,982:	298,590:	895,770
TOTAL ..	104,205,308:	32,444,223:	141,109,000:	110,099,228:	34,490,813:	149,295,000:	149,295,000

Table 3
Available Funds for McIntire-Stennis Cooperative Forestry Research
(In Dollars)

State	Fiscal Year 1982 Actual	Fiscal Year 1983 Estimate	Fiscal Year 1984 Estimate
Alabama	\$383,053	\$394,915	\$393,332
Alaska	207,680	221,258	220,371
American Samoa	- -	- -	- -
Arizona	185,758	198,606	197,810
Arkansas	361,131	372,264	370,772
California	390,360	402,465	400,852
Colorado	163,837	175,956	175,251
Connecticut	127,301	138,204	137,650
Delaware	68,843	70,252	69,971
Florida	302,674	311,861	310,611
Georgia	397,667	410,016	408,373
Guam	- -	- -	- -
Hawaii	98,072	100,453	100,050
Idaho	273,445	281,661	280,532
Illinois	200,372	183,506	182,770
Indiana	214,987	228,809	227,892
Iowa	119,994	123,104	122,611
Kansas	105,379	115,553	115,090
Kentucky	251,523	243,909	242,932
Louisiana	353,824	357,163	355,732
Maine	339,210	349,613	348,212
Maryland	171,144	168,406	167,731
Massachusetts	149,222	153,305	152,690
Michigan	346,517	364,713	363,252
Micronesia	- -	- -	- -
Minnesota	288,059	296,761	295,572
Mississippi	368,439	379,814	378,292
Missouri	236,909	266,560	265,491
Montana	244,216	259,009	257,971
Nebraska	83,458	85,352	85,010
Nevada.....	76,150	77,802	77,490
New Hampshire	193,066	191,057	190,291
New Jersey	141,916	145,755	145,171
New Mexico	156,530	160,856	160,211
New York	324,595	334,512	333,172
North Carolina	375,746	387,365	385,812
North Dakota	61,536	62,701	62,450
Ohio	229,602	236,358	235,411
Oklahoma	200,373	213,708	212,851
Oregon	412,282	425,117	423,413
Pennsylvania	295,366	304,311	303,091
Puerto Rico	- -	47,601	47,410
Rhode Island	54,229	55,152	54,930
South Carolina	309,981	319,412	318,132
South Dakota	90,765	92,903	92,530
Tennessee	266,138	274,110	273,011
Texas	317,288	326,962	325,652
Utah	134,608	130,654	130,131
Vermont	207,680	206,157	205,331
Virgin Islands	- -	- -	- -
Virginia	331,902	342,063	340,692
Washington	404,975	417,566	415,891
West Virginia	258,830	251,459	250,451
Wisconsin	280,752	289,210	288,051
Wyoming	112,686	108,004	107,571
Subtotal	11,670,070	12,054,283	12,005,969
Federal administration (3%) ...	360,930	372,813	371,319
Small Business Act	- -	24,904	74,712
TOTAL	12,031,000	12,452,000	12,452,000

Table 4

Payments to 1890 Colleges and Tuskegee Institute
(In Dollars)

	<u>Fiscal Year 1982 Actual</u>	<u>Fiscal Year 1983 Estimate</u>	<u>Fiscal Year 1984 Estimate</u>
ALABAMA			
Alabama A&M University	\$1,256,965	\$1,300,000	\$1,294,621
Tuskegee Institute	1,237,289	1,280,364	1,275,063
ARKANSAS			
University of Arkansas at Pine Bluff	1,083,707	1,123,396	1,118,738
DELAWARE			
Delaware State College	433,427	446,875	445,030
FLORIDA			
Florida A&M University	852,410	889,011	885,306
GEORGIA			
Fort Valley State College	1,353,215	1,408,087	1,402,229
KENTUCKY			
Kentucky State University	1,509,786	1,574,699	1,568,137
LOUISIANA			
Southern University	994,522	1,031,429	1,027,154
MARYLAND			
University of Maryland- Eastern Shore	724,119	750,203	747,094
MISSISSIPPI			
Alcorn State University	1,042,297	1,344,444	1,338,910
MISSOURI			
Lincoln University	1,394,864	1,469,435	1,463,257
NORTH CAROLINA			
North Carolina A&T State University	1,864,704	2,034,374	2,025,920
OKLAHOMA			
Langston University	973,233	1,018,620	1,014,362
SOUTH CAROLINA			
South Carolina State College	835,132	1,127,483	1,122,821
TENNESSEE			
Tennessee State University	1,437,220	1,542,783	1,536,367
TEXAS			
Prairie View A&M College	1,880,435	1,970,447	1,962,201
VIRGINIA			
Virginia State College	1,277,848	1,335,186	1,329,637
CRIS	29,200	31,900	35,000
Subtotal	<u>20,180,373</u>	<u>21,678,736</u>	<u>21,591,847</u>
Unobligated balance	666,867	- -	- -
Federal administration (3%)	644,760	670,476	667,789
Small Business Act	<u>- -</u>	<u>44,788</u>	<u>134,364</u>
TOTAL	<u><u>21,492,000</u></u>	<u><u>22,394,000</u></u>	<u><u>22,394,000</u></u>

Table 5

Distribution of Research Facilities to the
1890 Institutions and Tuskegee Institute
(In Dollars)

	<u>Authorized Under P.L. 97-98, Sec. 1433</u>	<u>Fiscal Year 1983 Estimate</u>	<u>Fiscal Year 1984 Estimate</u>
ALABAMA			
Alabama A&M University	\$4,000,000	\$800,000	\$800,000
Tuskegee Institute	7,000,000	1,400,000	1,400,000
ARKANSAS			
University of Arkansas at Pine Bluff	2,219,100	443,820	443,820
DELAWARE			
Delaware State College	1,751,400	350,280	350,280
FLORIDA			
Florida A&M University	1,191,400	238,280	238,280
GEORGIA			
Fort Valley State College	3,500,000	700,000	700,000
KENTUCKY			
Kentucky State University	1,431,800	286,360	286,360
LOUISIANA			
Southern University	2,169,600	433,920	433,920
MARYLAND			
University of Maryland- Eastern Shore	1,162,600	232,520	232,520
MISSISSIPPI			
Alcorn State University	1,886,100	377,220	377,220
MISSOURI			
Lincoln University	2,728,800	545,760	545,760
NORTH CAROLINA			
North Carolina A&T State University	4,000,000	800,000	800,000
OKLAHOMA			
Langston University	1,529,800	305,960	305,960
SOUTH CAROLINA			
South Carolina State College	1,245,100	249,020	249,020
TENNESSEE			
Tennessee State University	2,597,300	519,460	519,460
TEXAS			
Prairie View A&M College	7,000,000	1,400,000	1,400,000
VIRGINIA			
Virginia State College	<u>2,587,000</u>	<u>517,400</u>	<u>517,400</u>
Subtotal	48,000,000	9,600,000	9,600,000
Federal administration (4%)	<u>2,000,000</u>	<u>400,000</u>	<u>400,000</u>
TOTAL	<u><u>50,000,000</u></u>	<u><u>10,000,000</u></u>	<u><u>10,000,000</u></u>

PAYMENTS UNDER THE HATCH ACT

The Hatch program of research at the State agricultural experiment stations is aimed at improving rural living conditions, conserving resources, and promoting efficient production, marketing, distribution, and utilization of crops and livestock essential to the food supply or health and welfare of the people of the United States.

The following is a description of current activities and selected examples of accomplishments from these appropriated funds:

1. NATURAL RESOURCES

Current activities: 10 percent of total Hatch funds for research. Included are soil and land use, water and watersheds, outdoor recreation, environmental quality, fish and wildlife, and remote sensing.

Selected examples of recent progress:

Remote Sensing Aids Management of Renewable Natural Resources. Through comparison of satellite transmitted remotely sensed data determined from Landsat and two four-channel radiometers, a variety of natural resource parameters can be monitored. Researchers in the Renewable Natural Resources Division, University of Nevada, working with the wide band Landsat spectral regions and higher resolution spectral band peaked at wavelengths known to be related to chlorophyll A absorbance, biomass and infrared reflectance have been able to separate data needed for identification, inventory and monitoring of natural resource parameters. With this knowledge, resource managers can evaluate range readiness, forest defoliation, overgrazing by livestock and wildlife, riparian vegetation quality and other vegetative conditions.

Cost of Erosion Damage. There are direct economic benefits from preventing soil erosion. Determining cost of erosion damage to future income has been a major void in the soil conservation effort. A soil erosion damage function has been developed in the Department of Agricultural Economics at the Idaho Agricultural Experiment Station to measure the value of the topsoil lost, comparing a more erosive conventional practice to a conservation practice. For the wheat-pea area in the Palouse, a conservation tillage system can reduce soil loss by about one-half. From a 15-inch topsoil base, the additional soil loss with conventional tillage in a current year would reduce yield and therefore future income by about \$8.50 an acre in present value terms. For a farm with 1,100 acres of cropland the benefit from preventing the excess erosion this year would be about \$9,350 in present value terms. The benefit would be even greater with a more effective practice and with a shallower topsoil. The Research under Hatch and Special Research Grants funding supports the 3-state, multi-agency STEEP conservation research program.

Nitrate Pollution. Nitrate pollution of groundwater originates only in part from nitrogen fertilizers; legumes must share the blame. Pollution of potable waters by nitrates is a problem that poses a public health threat in some areas of Minnesota and the rest of the nation. Federal regulations require that potable waters have no more than 10 parts per million (ppm) nitrates for public safety. Eliminating the growing of corn, which must have additional nitrogen fertilizer for profitable yields, in favor of growing legumes such as soybeans, will not totally solve the problem soil scientists with the University of Minnesota Agricultural Experiment Station have found. When the scientists examined tile line drainage from a soybean field in southern Minnesota that was totally enclosed on all sides by plastic barriers in the soil, they found nitrate levels of 10 to 20 ppm. These nitrates came from natural nitrogen fixation by Rhizobacteria on the soybean plants' roots, as well as lesser amounts from native soil nitrogen, organic matter decay, and precipitation.

A Frost Warning System. The Satellite Frost Forecast System (SFFS) was shown to have potential to provide both frost warning and damage assessment potential. The warning provides data for decisions which could conserve a minimum of \$4.5 million per occurrence in citrus alone in terms of energy and labor should frost prevention activities be unnecessary or insufficient. The system being evaluated in the Fruit Crops Department at the Florida Agricultural Experiment Station as a part of a regional research project automatically acquires Geostationary Operational Environmental Satellite (GOES) infrared data and ground truth from 10 automated weather stations. Satellite data and ground weather were used to build both observed thermal maps and predicted maps as well as the channels through which these are disseminated using microcomputer network. Also reported is the performance of the physical model that predicts future temperatures from a solution of the energy budget near the earth's surface and the space model that interpolates the temperature forecasts into the 3,500 pictures making up the predicted map.

Time and Energy Reductions for Field Machinery Operations. Concern for energy conservation led to the construction of a heat exchanger by Illinois Agricultural Experiment Station agricultural engineers that uses heat from the exhaust and cooling systems of a combine engine to preheat grain in the combine bin for subsequent drying. Temperature rises achieved in corn varied from 6° to 20° C. Savings in energy costs. would repay the farmer in about seven years for the cost of the exchanger. The attractive feature of this development is that unavoidably wasted energy is reclaimed and applied to one of the largest energy consuming activities in agriculture, that of drying grain. This energy reclamation may be expected to increase in importance with escalating prices for natural gas and LP Gas.

2. FORESTRY RESOURCES

Current activities: 2 percent of total Hatch funds for research. Forestry related research under Hatch is closely coordinated with the McIntire-Stennis Cooperative Forestry Research program which has similar research objectives. The Hatch forestry research program is characterized by a higher degree of multi-institutional or regional projects.

Selected examples of recent progress:

Timber and Wildlife Habitat Tradeoffs in an Intensively Managed Loblolly Pine Forest. A model has been developed by School of Forest Resources scientists at Mississippi State University to assess tradeoffs between timber output and white-tail deer habitat. The model estimates cutting schedules by maximizing capitalized present net worth of a sample forest property subject to wood flow, acreage regenerated, and wildlife habitat restrictions. Some habitat diversity can be achieved by imposing wood flow and acreage regeneration requirements. Enhancing wildlife habitat to a higher degree can only be achieved by imposing wildlife habitat restrictions. These restrictions have a cost associated with them--timber revenue foregone. Estimates of the cost associated with providing four levels of white-tail deer habitat diversity on a selected loblolly-shortleaf pine hardwood forest in east central Mississippi ranged from \$0.84 to \$12.43 per acre per year. Application of the model to other situations can provide a systematic framework by which forest landowners/managers can assess the tradeoffs between timber and wildlife habitat for their forest holdings. The results will help quantify costs associated with wildlife habitat as well as an appropriate lease fee for hunting. Tradeoffs for other game species can be determined as research results are available on habitat requirements for other species.

Procedures to Produce Slash Pine Clones. A study of tissue culture methods to propagate southern pines at North Carolina State University led to a successful tissue culture process. The process reduces the time to develop high quality pines considerably. Present hybridization of pines requires decades to develop forest tree species because of the time lapse between crossing known parents, obtaining seeds, planting, and testing first generation selections. With the tissue culture process, clones of trees with promising properties can be developed in much less time. The first known clone Slash pine plantlets using this tissue culture process were planted near Jacksonville, Florida.

3. CROPS RESOURCES

Current activities: 41 percent of total Hatch funds for research. Included under the research program are crop protection and production systems for dependable and efficient production, quality improvement, quality maintenance, product development, and related commodity aspects of marketing of crops.

Selected examples of recent progress:

High Yielding Potatoes Developed in Colorado. A new red potato variety, Sangre, which produces a market yield of 84 percent No. 1 potatoes, has been released by the Colorado State University Agricultural Experiment Station. Sangre is high yielding, has superior storage and cooking characteristics and is excellent in flavor. It is adapted to a wide range of growing conditions in the United States and is expected to result in a major new red seed potato market for Colorado growers. Centennial Russet, previously developed by Colorado State University scientists and released in 1975, accounts for the bulk of a \$70 million potato industry in Colorado's San Luis Valley. This russet variety, and the development of seed potatoes free of blackleg disease, are together largely responsible for the increase of more than 25 percent in Colorado's production of marketable potatoes and its seed potato industry during the past five years. Centennial Russet is already the second most popular potato grown in California.

New Soft Red Winter Wheat Varieties. More than 80 percent of the acreage of soft red winter wheat in the United States is planted with varieties developed at the Purdue University Agricultural Experiment Station. Two new varieties, Alburn and Caldwell, released in 1981, and resistant to most known diseases and to Hessian fly, are expected to be widely grown. Losses in wheat yield for Hessian fly have been held below the economic threshold in Indiana for the past 25 years through the use of resistant varieties. A gene for resistance to this insect is effective for only about 10 to 12 years, then new, more virulent biotypes of the Hessian fly usually develop so that another gene must be incorporated into the variety releases. Since 1955, Hessian fly resistance genes H₃, H₅, and H₆ have been used in the Purdue program. Wheat breeders are preparing to use genes H₉, H₁₀, and H₁₁ in the near future. The constant need for new genes shows the importance of the continuing search for new wheat germplasm by State and Federal research personnel.

Semidwarf Soybeans Give Promise of Higher Yields. A new semidwarf soybean, Hobbit, was released by the Ohio Agricultural Experiment Station in 1981. This is the fifth such semidwarf variety released, joining, Elf (1977), Gnome (1979), Sprite (1980) and Pixie (1980). These semidwarf varieties are tailored for high yield environments (those capable of producing yields in excess of 50 bushels per acre) where normal height varieties may become severely lodged with significantly reduced yield potentials. Hobbit and Sprite have averaged more than 80 bushels per acre in Ohio tests compared to 60 bushels per acre for standard height varieties in high yield environments. The semidwarfs require special management procedures,

however, planting in rows 7 inches apart and seeding at a rate of 2 bushels per acre, in order to take full advantage of their potential. At the present time, U.S. farmers produce more than 69 million acres of soybeans, averaging only slightly better than 30 bushels per acre (30.4 bu/A nationally in 1981). It is estimated that 25-30 percent of the present soybean acreage could be classed as "high yield potential". If these acres were planted with Hobbit, Sprite, or similar semidwarf varieties, and properly managed, it is estimated that production of soybeans for domestic and export use could be increased by 350-500 million bushels or more from the same acreage. This would represent a significant impact on the world's food and protein supplies before the end of this decade.

Crop Production and Protection Systems. Excellent progress is being made at many State Agricultural Experiment Stations to develop crop production and protection systems to improve agricultural productivity. Plant breeders at the Texas Agricultural Experiment Station have released short-season, rapid fruiting, early maturing cotton types that avoid fall weather and insect build-up problems. Farmer profits have increased 31 percent. Arkansas is currently transferring to the Cooperative Extension Service a community-wide pest decision strategy program (50 square miles or larger areas) researched since 1972. Decisions on implementation of controls are based on insect activity throughout the community, not in individual fields. This approach allows for optimal management of the total insect population. Pilot programs indicate that Arkansas growers will save over \$1.8 million annually in insecticide costs for cotton, alone. The sugarcane protection system developed at the Louisiana Agricultural Experiment Station has reduced insecticide applications from 12 applications per year to an average of 2 applications per year with resultant savings. The protection system is based on resistant sugarcane varieties, naturally occurring parasites and the selective use of pesticides. Simulation research to predict in-season effects of drought, insect defoliation, disease incidence, irrigation and production factors on yield and dollar return at harvest promises to provide growers better information for decision-making to optimize productivity. Florida Agricultural Experiment Station end-of-season yield prediction research on the effects of drought and defoliation by insects in soybeans is currently within 10 percent of experimental plot yields. Illinois Agricultural Experiment Station research has developed a computer-based advisory system for early identification of economic disease problems to help growers make better decisions relative to choice of cultivar, tillage practices, rotation, or use of fungicides or nematicides.

Biological Control of Pests. Research on a wide array of indigenous and exotic biological agents is providing additional strategies for improved plant pest protection. Researchers at the Kentucky Agricultural Experiment Station have been developing a fungus (*Erynia* species) which infects and kills the larval stage of the alfalfa weevil, a primary pest of first-cutting alfalfa throughout the United States. The first fungus herbicide has been introduced as a result of research at the Arkansas Agricultural Experiment Station. The fungus controls curly indigo, a damaging weed in rice and soybean fields that causes reduced yields, interference with the harvest and reduced grade and quality. Extensive host range tests have shown that the fungus is genetically stable and host specific. A newly discovered bacterium, *Bacillus Thuringiensis* var. *israelensis* (BTI) has been evaluated for larval mosquito and blackfly control through regional research projects involving State stations in the Northeastern, Southern, and Western regions. Upon ingestion by mosquito and black fly larvae, the bacterial spores release a toxin which destroys the cells of the larval gut, leading to paralysis and death within a few hours. Field tests conducted with a wide range of other aquatic organisms indicate remarkable specificity of these materials for mosquito and black fly larvae. A low-virulence strain of the chestnut blight fungus has been isolated and under investigation by researchers at Michigan, Connecticut, Kentucky, Georgia, Virginia, and West Virginia Agricultural Experiment Stations; Duke University; and United States Forest Service.

This "diseased" variant of the chestnut blight fungus has been involved in isolated cases of recovery in infected trees and shows promise for saving the virtually extinct American chestnut tree. An endoparasitic nematode (Howardul: husseyi) has been developed by the Pennsylvania Agricultural Experiment Station for the suppression of phorid fly, the major fly problem in commercial mushroom houses. In a restricted mushroom house environment, parasitism rapidly increases from one phorid generation to the next and phorid populations are significantly reduced. Scientists at the Georgia Agricultural Experiment Station have discovered that innocuous soldier flies compete with and significantly suppress housefly larvae in manure. By introducing soldier flies, adults of which do not enter poultry houses, a poultry farmer can cut his insecticide costs by thousands of dollars. In addition, soldier fly larvae can be harvested and fed to swine or pond-raised fish. Research at the California (Berkeley) Agricultural Experiment Station resulted in the importation of seven species of natural enemies from South America to control scale on groundcover ice plants which are extensively grown along the state's highways. Annual cost of insecticides for control of scale on highway ice plants in California has been \$150,000. The total cost of the research on importation of effective parasites from 1977 to 1981 was \$191,000 which was approximately equivalent to one year's spray cost.

Plant Resistance to Diseases and Insects. Cooperative research efforts between plant breeders, plant pathologists, and entomologists are leading to better understanding of the mechanisms of pest resistance and inheritance resulting in the release of varieties with improved resistance to multiple pests and excellent agronomic characteristics. The latest cotton variety released by the Louisiana Agricultural Experiment Station was Gumbo 500, an open-canopy cotton variety created by a narrow okra leaf. By allowing more sunlight to penetrate the canopy and more air to circulate below the canopy, the relative humidity is lower thereby reducing the incidence of boll rot and some insect pests. In addition, Gumbo 500 variety exhibits improvement in yields, earliness of maturity, lint percentage, fiber quality, and resistance to Fusarium wilt. The Pope sweet potato cultivar released by the North Carolina Agricultural Experiment Station has many advantages over the old cultivar Jewel. Pope is a high-yielding, early-maturing cultivar that has high resistance to Fusarium wilt, southern root knot nematodes, and flooding damage or souring in the field. High losses have occurred in North Carolina due to high soil moisture and flooding. In addition Pope has more resistance than Jewel to Streptomyces soil rot and internal cork virus while maintaining equal or improved resistance to wireworms, grubs and flea beetles.

Mechanisms of pest resistance and inheritance is contributing to the ability to develop more effective resistant varieties. Plant pathologists at the Pennsylvania Agricultural Experiment Station have exploited the multi-gene approach for plant disease resistance to accumulate genes for broad-based horizontal resistance to rice blast in new rice selections. Taking advantage of observations that old land-races of rice are generally "slow-blasters", the Pennsylvania scientists have transferred this characteristic into new rice varieties with more stable blast resistance. These plants are thus able to live and produce good yields although some blast occurs. This disease management approach is of compelling importance to the U.S. rice crop and to nations in which rice is the major food staple.

Japanese beetle olfaction research at the New Jersey Agricultural Experiment Station on a variety of host plants has demonstrated that insect detection of specific plant volatiles is the key to host selection and possibly also host preference. Aphids placed on resistant and susceptible varieties of alfalfa at the Nevada Agricultural Experiment Station could "taste" differences between the varieties. A low molecular weight, water-soluble compound was isolated from resistant varieties. And juglone (5-hydroxy 1,4 - naphthoquinone) was found associated with resistance to

the fungus causing scab disease in pecan and other hickory species (Mississippi Agricultural Experiment Station). Identification of factors contributing to resistance to insects and plant pathogens can accelerate the breeding process to incorporate resistance into new varieties.

Solving Emerging Plant Problems. A number of emerging problems are typically addressed by the State Agricultural Experiment Station system. In 1980 a new soybean leaf disorder, named "soybean leaf scorch", affected 50,000 acres of the poorly drained Atlantic Coast flatwoods of Georgia. In localized areas, crop failure was 100 percent. The potential area for this disease was estimated to be 400,000 acres -- one-sixth of Georgia's total soybean acreage. Prompt field, greenhouse, and laboratory studies by University of Georgia Experiment Station scientists led to the discovery that soybean leaf scorch is caused by high levels of chlorine in the soil, which, probably accumulates from fertilizer applications. Georgia scientists have developed an automated method for detecting chlorine in the soil and have identified several soybean varieties that are tolerant to chlorine. As a result, farmers throughout the Southeast Atlantic Coast flatwoods area can take steps to prevent losses from the devastating disease.

The red-banded leafroller, formerly only a curio, suddenly flared up and became an extremely destructive pest in New Jersey blueberry fields. In 1979 high infestations of packaged berries caused rejection of entire truckload shipments. More important than the dollar losses, estimated at \$200,000, was the serious threat to the high prestige value of cultivated blueberries. Research at the New Jersey Agricultural Experiment Station yielded data which enabled registration of an insecticide (methomyl) and of a biological control agent (Bacillus thuringiensis) previously not used in blueberries to control this pest. Findings in the New Jersey blueberry research program have traditionally been helpful to blueberry growers in other states as well.

In 1981 bean rust became a serious problem in North Dakota's dry edible beans valued at over \$100 million. In controlled tests, rust reduced yield 13-52 percent. Some production fields were totally destroyed and almost all beans in the State were affected by rust with losses exceeding \$40 million. The North Dakota Agricultural Experiment Station developed a fungicide that is effective at low rates and is effective even after the disease is in the field, substantially reducing losses to this pest.

Pine wilt, a newly recognized and devastating disease in the United States in 1979, is caused by the pinewood nematode. This complex disease involving a tiny parasitic worm, an insect vector and a wood-staining fungus suddenly increased to epidemic proportions during 1980 and 1981. Illinois became the national center of severity of pine wilt. Farmers are losing irreplaceable top-soil because carefully nurtured windbreaks are falling victim to pine wilt, Christmas tree plantations are suffering severe losses and homeowners are losing resale value because 50-year-old pines are--becoming within a single season--dead brown eyesores. The Illinois Agricultural Experiment Station in collaboration with colleagues in Missouri and other North Central States organized a National Pine Wilt Disease Workshop and national regional project NCT-133 to focus a multi-disciplinary research effort on this problem. Research conducted in Illinois and collaborating States has yielded valuable basic information vital to developing strategies for managing the pine wilt complex.

4. ANIMAL RESOURCES

Current activities: 28 percent of total Hatch funds for research. Included under this research program grouping are protection, production and management aspects of beef and dairy cattle, swine, sheep, other animals, poultry, and aquaculture. It also includes quality improvement, product development, and related commodity aspects of marketing.

Selected examples of recent progress:

Embryo-Splitting Procedures in Cattle. Scientists at the Colorado Agricultural Experiment Station have developed improved procedures for splitting embryos to obtain identical twins in cattle. They now have two identical twin heifers, produced by non-surgically recovering embryos from a donor cow, splitting them, and transferring them to a recipient mother.

They are awaiting the birth of 10 more sets of twins, also produced by embryo splitting and transfer. The ability to produce identical twins will cut costs and speed up development in research aimed at improving livestock production. Identical twins are invaluable for studying sexual development and nutrition, for example. The method is still too costly for the average livestock owner to use.

Utilization of Crossbreeding in the Bull-Beef Concept. Nevada State Agricultural Experiment Station scientists have explored the potential of bulls as a source of quality protein in the diet as opposed to traditional production with castrated males (steers). It was found that young bulls are about 15 percent more efficient in converting feedstuffs to edible tissue than steers. Current studies indicate that producers can realize additional savings in production costs by utilizing crossbred bullocks, rather than straightbreds, for beef. Meat from bullocks also have a much lower fat content than steer beef. Differences in palatability of bullock and steer meat are negligible from young animals. These results could influence current beef production methods by providing greater efficiency, at the same time providing greater economy and consumer acceptability of beef products.

Crossbreeding and Selection Preserves Dairy Breeds' Genetic Variation. Crossbreeding and selection preserves red-and-white dairy breeds genetic variation. Ten million of the approximately 11 million dairy cattle in the United States are Holsteins. Concentration on this breed to the exclusion of other dairy breeds has resulted in a narrowing of the genetic base needed for continued genetic improvement of dairy cattle in Minnesota, one of the nation's leading dairy states. Crossbreeding and selection work has been done with the red-and-white dairy breeds by the University of Minnesota Agricultural Experiment Station since 1960 to preserve the genetic variation these breeds can offer for genetic improvement. Since 1960, the Minnesota station's Milking Shorthorn herd's rolling herd average (RHA) has increased from 7,220 pounds of milk to 13,200 pounds. During the same time, the average butterfat production in the herd has increased from 258 pounds to 515 pounds. This has been accomplished by crossbreeding the Milking Shorthorns with leading New Zealand Milking Shorthorn, Australian Illawarra Shorthorn, Ayrshire, and Norwegian Red sires. The red and white herd now includes milking daughters of a Norwegian Red bull that are producing near the level of their Holstein contemporaries.

Selection for Multiple Births in Sheep. Research on selection for multiple birth in a flock of Western white faced ewes at the Wyoming Agricultural Experiment Station has resulted in an increased lambing rate of 132 percent in 1970 to an apparent plateau of approximately 200 percent in 1978. This trend continued through 1980. Primary selection was based on birth type, a trait which can be measured easily and accurately with secondary selection on performance. These results suggest that selection for multiple birth can be successfully used to increase lambing rate and economic returns in sheep production.

Control of Ovarian Function in the Laying Hen. Hormonal control during various stages of egg yolk development has been explored at the New Jersey Agricultural Experiment Station. The blood flow to the developing egg was found to progressively increase until just before ovulation, at which time it dramatically decreased. While the administration of a specific hormone [prostaglandin (F₂ alpha)] reduced blood flow at any time, the production of this compound increased only at ovulation. Accumulated evidence indicates that adrenalin is also involved in the control of ovarian function via the control of hormone release and also adrenalin receptors in the ovary. Expanded knowledge of the basic mechanisms that control ovarian function may suggest new approaches to increasing the efficiency of both table egg production and reproduction in poultry and help to better understand the reproductive process in mammals, including man.

Rapid Method for Screening Suspect Foods. Research conducted using Regional Research funds at the New Jersey Agricultural Experiment Station has shown that voluntary exercise by low cost small test animals such as the chick and rat can be rapidly modified by changes in diet composition, and also by the presence of heavy metals and microorganisms that cause infectious illness. Depending upon the contaminant and the dietary level the voluntary exercise may indicate either hyper- or hypo activity. Hypoactive responses are generally associated with the high levels of toxic metals or infectious illness. Costs of obtaining FDA clearance for dietary components and drugs can result in expenditures of millions of dollars. The New Jersey methodology could provide a fast economical early screening prior to these huge expenditures for detection of unknown contaminants deleterious to human health and to satisfy requirements imposed by foreign countries for neurotoxicological clearance of USA products destined for export.

Mastitis Control Test. Virginia dairy farmers have saved a minimum of \$6,000,000 per year (\$60 per cow per year) because of a procedure developed by Virginia Agricultural Experiment Station researchers, the Virginia Dairy Herd Improvement Association (DHIA), and 30 cooperating Virginia dairy herds. The research led to the development of a procedure for measuring the somatic body tissue cell count in milk samples from individual cows. The somatic cell count, once it reaches a certain level, indicates the cow has mastitis. Being able to monitor the count has led to effective management of mastitis and reduced the average somatic cell count from 450,000 per milliliter in 1978 to 258,000 in 1982. The procedure also increased the average milk production by 264 pounds per cow per year. In 1981, Virginia moved above the national DHIA average production per cow.

Effective Diagnosis and Treatment of Liver Fluke Infections in Cattle and Sheep. Washington Agricultural Experiment Station scientists have developed an enzyme-linked immunosorbant assay (ELISA) for diagnosis of liver fluke infections in cattle and sheep. They found that the test works well for both hosts and will detect infection much earlier than fecal examination. The ELISA method thus offers the clinician the advantage of early diagnosis and the opportunity to treat while immature flukes are migrating through the liver. The researchers also found a chemical, albendazole, to be efficacious against liver fluke infections in cattle, sheep, and goats. Their work has resulted in the product being cleared for use in the Northwest, which represents one of the most important contributions of their project to regional producers during the past three years. Liver flukes are responsible for the condemnation of over 1.2 million cattle per year, resulting in a loss of more than \$10 million annually.

5. PEOPLE, COMMUNITIES, AND INSTITUTIONS INCLUDING RURAL DEVELOPMENT

Current activities: 6 percent of total Hatch funds for research. Included under this research program grouping are individuals and families, living environment, and communities, institutions and services.

Selected examples of recent progress:

Removal of Pesticide from Clothing. Researchers at the University of Nebraska have determined the kind of laundry procedures that achieve the optimum removal of two pesticides from clothing. The two pesticides studied were methyl parathion and 2,4-D. These findings are particularly important to agricultural workers as previous research showed that the principal route of pesticide absorption into the body is through the skin and not the respiratory system. The findings have been disseminated by the Extension Service and groups who train workers in pesticide application.

Purposes for Owning Land Differ. Landowners who grew up in an urban setting want to own land for recreational or investment purposes. Those who grew up in rural areas feel that food self-sufficiency, agricultural production and returns for cost are the most important reasons for owning land. These are some of the findings from a survey of land users in Connecticut, Delaware, Maine, Maryland, New Hampshire, New Jersey, Pennsylvania, Vermont, and West Virginia. Responses to questions about values and attitudes concerning rural land use were received from 1,645 rural residents of the nine states. The scientists participating in the Northeast Regional project have completed a comprehensive analysis of the research results to establish relationships between rural land and employment, population, and other socioeconomic factors. Findings from the study are being used to develop growth management strategies for rural areas where there is rapid in-migration and population growth.

Most Elderly Want to Remain Independent. Most rural elderly want to remain in their own homes and be independent, according to a survey conducted by the New Jersey Agricultural Experiment Station and their collaborators in Pennsylvania, Maine, New Hampshire, Vermont, and West Virginia. The existence of informal helper networks in these rural areas make it easier for the elderly to live alone successfully. They help the elderly get housing and social and community services. This information is important to state and local social service agencies, as they and other groups develop service delivery systems for the rural elderly.

Planning for Rural Non-Farm Growth. Publications resulting from a study at Cornell University (NY) have been used as a guide in designing laws for agricultural districts, for general rural planning in response to rural non-farmer population growth, and improvements in assessment classification of rural property. Other publications identify factors that affect the return of cropland to farm use and an identification of the agribusiness sector in a selected area of New York. Both the Appalachian and Finger Lakes regions of New York state were studied to determine the extent and nature of agriculture and the trends in relation to urban growth and dispersion of non-farm users of rural areas. The application of results of the research increases the recognition that rural development planning can be an effective tool in land classification and related tax assessment.

6. COMPETITION, TRADE ADJUSTMENTS, PRICE AND INCOME POLICY

Current activities: 7 percent of total Hatch funds for research. Included under this research program grouping are farm adjustments, prices and income, economic aspects of marketing and competition.

Selected examples of recent progress:

Accurate Formula for Estimating Changes in the Market Value of Farm Tractors Over Time. An econometric analysis completed by agricultural economists at the Kentucky Agricultural Experiment Station has resulted in a more complete and accurate formula for estimating changes in the resale and trade-in values of farm tractors. It was found that for each year a tractor ages, there is a smaller decline in its real dollar resale value, that larger tractors decline in value less rapidly than smaller ones and that increases in net farm income results in lower resale value for tractors. The latter result indicates that farmers opt to buy new tractors rather than used units when net farm income increases. The results have been used extensively by tractor owners, machinery dealers and manufacturers.

Economics of No-Till Crop Production. Agricultural economists at the North Dakota Agricultural Experiment Station recently completed a study of the costs and returns and estimated reduction in soil erosion associated with no-till crop production. The costs of raising spring wheat, barley, and winter wheat under no-till were compared with conventional tillage both with and without no-till summer fallow. The cost of spring seeded no-till small grain under continuous cropping was only slightly higher than conventional tillage. Cost savings related to the nonuse of tillage equipment offset the increase in herbicide costs. The cost of chemical fallow with currently cleared chemicals was higher than tillage. The cost of raising winter wheat in a no-till system is substantially less than conventional production. Soil losses under no-till were found to be nominal while under conventional tillage, soil losses were estimated to average 2.73, 5.79, and 7.47 tons per acre for spring wheat production in eastern, central and western North Dakota, respectively. The results explain the increasing acreage being devoted to no-till crop production in North Dakota and the nation. This technology has not only reduced production costs and increased the incomes of individual farmers but has made important contributions to conserving the nations valuable soil resources.

Economic Reasons for the Decline in the U.S. Sheep Industry. Agricultural economists at the Nevada Agricultural Experiment Station analyzed the U.S. sheep industry using different econometric techniques. The major objective of the research was to determine the economic reasons leading to the decline of the lamb and mutton and wool industries. The results of the analyses indicate that lamb and mutton consumption generally declined as per capita consumer income increased over the estimation period from 1953 to 1978. Results also showed that increased variability of slaughter lamb and mutton prices imposed much greater risks on producers. This risk factor was also associated with declining lamb and mutton production. The increased price risk for producers and decreased consumer demand associated with rising incomes resulted in reductions in slaughter numbers and breeding herd size. Since wool is a joint product in the production of lamb and mutton, the production of this commodity has also declined. This study has identified the basic reasons that the sheep industry is declining in the U.S. Unless changes are brought about by the industry or through government policies that alter consumption patterns and alleviate producer income risks, the U.S. production of lamb and mutton and the joint product, wool, will continue to decline. The nation's need for these products are likely to be provided from imports in the future.

Computer Generated Budgets for Better Managerial Decisions. Economists at the Idaho State Agricultural Experiment Station have implemented a statewide program for developing computer generated budgets for crop and livestock enterprises. This program guarantees a uniform analysis of physical and economic data from various parts of the State. It allows these enterprise budgets to be regularly updated to adjust for changes in prices, technology and for changes in crop and livestock patterns. These enterprise budgets are widely used in different levels of decision making, such as in the production planning on the farms, both by the farm manager and the extension specialist. Credit agencies use them in determining prospective farm loans. The budgets have also been the basis for renegotiation of contracts between producers and processors of agricultural products. The enterprise budgets also have been a cost saver in obtaining data for agricultural research particularly in data collection.

7. FOOD SCIENCE AND HUMAN NUTRITION

Current activities: 6 percent of total Hatch funds for research. Included under this research program grouping are human nutrition, food processing, food safety, food service, and food storage, distribution and marketing.

Selected examples of recent progress:

Human Nutrition and Poultry Science Research Produces Joint Benefit. Poultry scientists at the Wisconsin Agricultural Experiment Station were examining ways to add barley to poultry diets when they discovered cholesterol-inhibiting effects in a barley component and also in a dried fungal culture filtrate that had been added to digest plant gums and thus improve digestibility. Nutrition scientists at Wisconsin then tested these products in pigs, a species whose metabolism resembles that of humans more closely than poultry, and found the same effect. Apparently, both the barley and the fungal preparation inhibit an enzyme which controls cholesterol synthesis, but have no other adverse effect. In addition to having potential direct therapeutic value for certain kinds of heart diseases in humans, feeding the preparations reduces cholesterol levels in eggs and in pork by 25-40 percent, and increases the rate of animal weight gain by 8-10 percent. Neither agent has yet been completely identified, but the barley compound is in the non-fiber portion of the grain, while the agent in the culture filtrate resembles an estrogenic hormone.

Vitamin B₁₂ Deficiency Affects Lipid Metabolism. Observations made recently by nutrition scientists at the Georgia Agricultural Experiment Station may provide a basis for understanding the neural lesions associated with pernicious anemia, and also the susceptibility of laboratory animals and perhaps of humans to respiratory infections which is characteristic of vitamin B₁₂ deficiency. In metabolic studies on rats, they found that those which are vitamin B₁₂ deficient are unable to make normal amounts of long chain polyunsaturated fatty acids. Instead, they synthesize abnormally high amounts of odd-numbered saturated fatty acids, which are incorporated into the membrane within and around the cells and probably affect the functionality of such cells. This difference in fatty acid metabolism is especially apparent in neural and lung tissues, thus possibly explaining previously observed neural deterioration in the anemia associated with vitamin B₁₂ deficiency.

Campylobacter, a Bacterial Food Pathogen. The bacterium, Campylobacter, is a newly recognized cause of food poisoning which may be even more prevalent than Salmonella. Major symptoms are abdominal pain, diarrhea and fever. Campylobacter may be responsible for a large number of the 50 percent of the foodborne cases never identified because satisfactory analytical techniques are

not available. Scientists at the Wisconsin Agricultural Experiment Station have now developed a sensitive technique for detecting *Campylobacter* in foods. By using this new method, scientists will be able to identify and trace the organism in foods and then develop control measures to increase the safety of our food supply.

Early-Post Slaughter Temperature as a Determinant of Meat Tenderness.

Wisconsin Agricultural Experiment Station scientists studying meat toughness found that cooling beef carcasses slowly lets natural enzymes break down protein and thereby increase meat tenderness. Slowing the cooling rate of leaner carcasses prevents much of the toughness associated with lean beef. Lean carcasses are held in warm (about 95 degrees) "hotbox" for three hours after slaughter. Meat is then chilled normally. This technique could reduce the length of feedlot finishing, lower production costs and give consumers tender beef containing less fat. The process cannot make a really tough carcass tender, but it can make a moderately tough carcass tender. Producers and consumers are used to a beef quality-grading system which emphasizes marbling (fat deposits in muscle), and it may be difficult to convince either group that a lot of fat is unnecessary for eating quality. The prohibitive costs of fattening cattle to high quality grades now mean cattle are fed for a shorter time, and fewer cattle are fed to the desirable "choice" grade.

The Influence of Chemical Constituents of Meats on Its Quality. Consumers want lean beef--but the problem is that really lean beef, fed only on grass, does not taste as good as the corn-fed beef. Scientists at the Missouri Agricultural Experiment Station have developed sophisticated techniques to solve this dilemma. By using gas-liquid chromatography-mass spectrometry, they can separate and identify the hundreds of compounds responsible for beef flavor. In 30 minutes in the laboratory, scientists can identify 70 different flavor compounds and record their concentrations--and do it time after time, instead of depending on people's subjective impressions. The procedure is now used to determine the compounds responsible for "off flavor" in meat. The method offers researchers a way to measure meat flavor that is more dependable, quicker, and cheaper than panels of human taste-testers. An early result is the discovery that beef of very acceptable flavor can be produced by feeding cattle on corn for a period of only six weeks before slaughter. That is much less time--and much cheaper--than the 120- to 140-day turn in the feedlot usually given cattle destined to go to market as "fed" beef--the kind consumers are used to eating as steaks and roasts.

Utilization of Sprout Damaged Grain. Each year, some sprouting of grain occurs and producers suffer financial losses in the market place due to sprouting. North Dakota State Agricultural Experiment Station food scientists studied non-traditional high temperature drying levels and found that pasta made from sprouted durum wheat showed improved quality. Since flour used by U.S. bakeries requires a specified level of malted (sprouted wheat) flour, it was determined also that certain levels of sprout damaged hard red spring wheat could be used in bakery flour provided the level of sprouting could be accurately determined. A quick, instrumental method was devised to accurately and quickly describe the degree of sprouting. Such an instrument called the Grain Amylase Analyzer was developed to measure sprout damage as alpha-amylase activity. Use of the instrument to formulate flour combinations will result in top quality pasta products.

Rapid Technique for Evaluating Protein Quality. Nebraska State Agricultural Experiment Station scientists have developed a rapid and inexpensive technique for evaluating protein quality in foods and food ingredients as an alternative to the lengthy and expensive rat bioassay, which was the only accepted method for determining (Protein Efficiency Ratio) PER. The research culminated in the Association of Official Analytical Chemists granting "Official First Action Approval" to the C-PER (computed PER) assay. After a 1-year probationary period (ending October 1982), if final approval is granted, the

method, which evaluates protein quality in 72 hours via a sophisticated computer model, will be a procedure recognized in a court of law. As an officially accepted method, the C-PER assay could save the food industry considerable expense and assure consumers of less variation of protein quality in the foods they eat. In addition, the model could be used for rapid evaluation of different foods currently being investigated in developing countries.

COOPERATIVE FORESTRY RESEARCH

The Cooperative Forestry Research (McIntire-Stennis) program is planned and directed to provide answers to the complex questions that face forest land managers seeking to produce an adequate timber supply for home and other uses. Timber production and wood utilization and distribution systems are key elements of forestry research. The research also deals with the demands for wildlife production and recreational opportunity on forests. Acceptable level of environmental quality in all forest operations and uses is an important national goal to which this research is dedicated.

In addition, the McIntire-Stennis program has the objective of helping to create and maintain a highly qualified corps of forest scientists through involvement in the research projects beginning as graduate student assistants. These young men and women serve in private industry, and in various levels of government as managers and scientists as our efforts to produce more goods and services per acre of land intensifies with time.

Following is a description of current activities and selected examples of accomplishments from these appropriated funds:

Current activities: The following research program activities encompass the range of research funded under this act:

Multi-resource inventory, appraisal and evaluation. Assessment of supply, growth and demand, new inventory methods, alternative and multiple uses, economic and social benefits.

Forest resource management. Land productivity and forest growth, reproduction of trees and stands, improved varieties, institutional regulations and forest management.

Forest protection. Systems for detecting and evaluating losses to insects and diseases; control methods; fire detection, monitoring, and control.

Harvesting, processing, marketing. Energy efficient equipment; environmental concerns; wood properties and uses; biomass for energy; rural development role of forests and forest industry.

Forest watersheds, soils, pollution. Quality, quantity water production; effects of forest management on nutrient cycling, water quality and productivity; effects of sewage disposal; air quality effects, amelioration of air and noise pollution.

Forest range, wildlife, fisheries habitat. Use and effect of grazing, forest-range management, wildlife habitat maintenance, costs and benefits.

Forest recreation and environmental values. Recreation opportunity expansion methods; demand, cost and benefit analyses; environmental quality improvement; effects on forest environment.

Selected examples of recent progress:

Economic Opportunities in Forest Management. A University of Mississippi study of economic returns from Mississippi woodlands in which two types of forest management were practiced showed a greater economic return for intensive forest strategies. Cut-and-let grow vs. plantation management strategies showed that by adopting active management schemes forest landowners would earn an annual increment of \$25.00/acre/year vs. the \$4.00/acre/year obtained by letting "nature take its course" after harvest. Owners taking advantage of cost-share programs would have earnings of \$29.00/acre/year. In terms of the forested acreage in Mississippi the adoption by private- non-industrial land owners of research developed for intensive forest management practices would result in an increase of \$90 million annual income to those owners of forest land.

Forest-Industry Scrap Source for Liquid Fuel. Tars similar to crude oil are generated by heating pine residues and have produced a high octane hydrocarbon fuel. Forest scientists in Texas, using technology employed in the petrochemical industry have refined the technique for processing these tars that offers considerable savings over other methods deriving liquid fuel from biomass. This new fuel possesses a higher octane rating than gas and requires no engine modification before use. Tars can be produced from any plant product: wood chips, bark, corn cobs, and wheat stems are examples of agricultural residue which would offer good potential as fuel stock using this process. With premium liquid fuel as a byproduct some existing industries could employ less expensive manufacturing processes in which high levels of tar would be acceptable and even encouraged.

Better and Cheaper Methods of Predicting Site Index Developed Using Height and Diameter of Trees. Researchers at Rutgers University and at the University of Montana have developed a system for predicting site index, a measure of potential productivity, using height-diameter relationships in trees. Knowledge of potential productivity of forest sites is necessary for effective planning and natural resources management. Measuring site index in the traditional ways is expensive. It has been shown for eastern hardwoods in the work at Rutgers, and for western larch in the work at the University of Montana, that height and diameter relations can be used to predict site index with acceptable reliability. Because height and diameter can be measured or estimated from aerial photographs, site index can be predicted using remotely sensed data. The cost of making the predictions will be reduced substantially; better land planning will result.

Hydrologic Impact of Grazing Quantified. Grazing by domestic livestock is a common land use practice on millions of acres in the western U.S. The grazing animal has an impact on run-off and erosion through removal of plant cover and through trampling disturbance which often results in compaction of surface soils. Findings from a study at Utah Agricultural Experiment Station indicate that trampling disturbance has a greater impact on the ability of the soil to absorb water than does removal of vegetal material. However, the presence of plant cover is the prime factor in controlling erosion. Light and moderate grazing intensities provide essentially the same hydrologic impact while heavy grazing is much more detrimental. A simple model has been constructed to predict infiltration rates under any grazing scheme. The findings of this study will provide valuable insight into devising proper grazing practices which will result in minimal watershed damage and, therefore, maintain desirable quantity, quality and timing aspects of the most valuable product produced from western forested rangelands--water.

Precommercial Thinning 40-80 Year-Old California White Fir Forests Can Be Cost-Effective. Many natural conifer forests are densely stocked with currently unmerchantable trees. As stand density increases, there is a loss in potential merchantable productivity. University of California, Berkeley, researchers have investigated the extent to which precommercial thinning can increase the growth rate of residual trees and reduce the time needed before a commercial harvest can be carried out. To project the costs and benefits associated with precommercial thinning, a model was developed to predict the diameter growth of trees after thinning to different densities. Sixteen thinning prescriptions were simulated utilizing various combinations of diameter limits for harvesting and residual numbers of trees to be left after thinning. The future growth of the forest after thinning was projected until average stand diameter reached a pre-determined level. Results were compared by calculating the net contribution of thinning to the stand's present net worth. The study showed that precommercial thinning can result in a contribution to present net worth of up to \$475 per acre, depending upon the specific thinning treatment selected.

Loblolly-Bay Offers an Alternative to Loblolly Pine for Pulpwood in Pocosins and Bogs in the Atlantic Coastal Plain. Researchers at Clemson University have discovered that the naturally occurring loblolly-bay may be an acceptable alternative to loblolly pine as a source of pulpwood. At present, intensive site preparation is necessary to establish loblolly pine in the pocosins and bays which make up large acreages along the Atlantic Coastal Plain. Loblolly-bay, however, is a naturally occurring tree of these areas and is a good candidate for management. Its form and growth characteristics indicate that it could be used as a source of pulpwood. This alternative would reduce energy needs for intensive site preparation and at the same time assuage those who are opposed to intensive management on these sites. Development of a management scheme for loblolly-bay will take pressure off landowners who want income from their land but are presently not able to reconcile the high impact of intensive management of loblolly pine. Researchers have developed silvical data on growth rates, site suitability, regeneration potential, and the paper-making properties of the wood, all of which point to the species as a successful candidate for management.

1890 COLLEGES AND TUSKEGEE INSTITUTE

A formula funded research program for the 1890 Colleges and Tuskegee Institute was established in the Food and Agriculture Act of 1977. Section 1445 of P.L. 95-113 authorized annual appropriations to support continuing agricultural research at the 1890 Colleges and Tuskegee Institute and funds were appropriated beginning in fiscal year 1979.

The following is a description of current activities and selected examples of accomplishments from these appropriated funds:

Current activities: The 1890 Colleges and Tuskegee Institute previously received funds for research under the authority of Public Law 89-106, which gives grant authority for awards up to 5 years. At the present time, there are 46 active Public Law 89-106 research grants that support research projects being conducted at these institutions. The existing grants will be carried through to termination by the end of fiscal year 1983.

The annual research program at the 1890 Colleges and Tuskegee Institute places emphasis in the areas of human nutrition, rural development and quality of living, and limited resource farming.

The research projects currently being conducted in the 1890 Colleges and Tuskegee Institute are distributed into several research programs as follows: natural resources, 10 percent; crop resources, 25 percent; animal resources, 28 percent; people, communities, and institutions including rural development, 17 percent; competition, trade adjustments, price and income policy, 3 percent; and food science and human nutrition, 17 percent.

Selected examples of recent progress:

Heavy Metal Uptake by Soybeans in Soils Amended with Sludge. At North Carolina A&T State University agricultural scientists have applied sludge to agricultural soils to study the uptake of heavy metals by different crop plants. The results show that increased concentrations of cadmium, nickel, and lead accumulate in the shoots and roots of soybeans grown in sludge-amended soil as compared to the control. The heavy metal concentration in the plants increased with increasing levels of the sludge amendment in the soil. The uptake of heavy metals was greater, however, in the roots than in the shoots indicating that there must be some barrier in the roots that regulates the movement of the heavy metals from roots to shoots. Although there were no phytotoxic effects of heavy metals on soybeans themselves with the rates of sludge studied, it is likely that the incorporation of large amounts of sludge into soils containing root crops could create toxic problems.

Effects of Agricultural Drainage on Natural Systems. Research at Delaware State College has identified the physical changes which take place in wetland environments associated with the reconstruction of agricultural drainage ditches in Class II soils (good cropland soils requiring some special management or treatment). Because many areas require drainage before profitable farming can take place, the findings will be potentially extended to the drainage management of more than one hundred million acres of cropland. Knowing how agricultural drainage practices affect natural systems will allow the development of management techniques which keep us in harmony with nature. An unforeseen development of the extensive network of sampling stations will allow for ground verification of satellite remote sensing data at a high level of accuracy.

Soybean Resistance to Corn Earworm. A soybean with partial resistance to the corn earworm (*Heliothis zea*) has promise for release. Field and laboratory screening at the University of Maryland - Eastern Shore has revealed three soybean lines which have shown partial resistance in the form of a non-preference for leaf feeding. These lines are the result of genetic crosses between unimproved resistant material and two varieties, Williams and Beeson. One of the lines has also shown indications of an antibiosis effect causing larvae to remain small and larval development to be prolonged. Although it is rare to develop a variety which is immune to insect attack such levels of partial resistance can have a marked impact on insect populations especially where more than one generation occurs per season. Resistant varieties are an environmentally sound alternative to costly insecticide treatments.

Breeding Sweet Potatoes for Tolerance to Minimum Cultural Conditions. Researchers at the University of Arkansas at Pine Bluff have screened sweet potato genotypes for adaptation to lowered production costs and at the same time increased yield and quality. They found certain genotypes, which grow better with less fertilizer and reduced pesticide application and are more tolerant to weeds, diseases, insects, and nematodes. They have also found that, by selecting for specific genotypes, the man-hours necessary to raise the crop can be cut by as much as 30 percent. Two

genotypes studied showed a 20 percent greater increase in yield over the two leading cultivars now planted in Arkansas and contained greater total soluble solids, cortex thickness and dry matter.

Catfish Reared in Cages Offer a Low Cost, High Protein Source to Low Income Farmers. Research at the University of Arkansas at Pine Bluff Research Center indicates that catfish reared in cages are a low cost, high protein human food. Studies showed that 5-6 inch fingerling catfish can be stocked at the rate of 200 fish per cubic meter in cages and yield 175-200 pounds of fish after one summer growing season (April-November). Cost to produce one pound of live fish ranges from 63-70 cents.

Rapid Test for Meat Tenderness. There is still a need for a rapid, reliable, reproducible, objective test for poultry meat tenderness. Scientists at Tuskegee Institute have developed a microscopic procedure and obtained good correlations between the length of the sarcomere (a muscle structural unit) and tenderness scores determined by a taste panel. Because the microscopic method requires only a very small muscle tissue sample it is possible to "biopsy" muscle and determine the tenderness. This tool will be valuable in breeding programs and in determining birds' potential market value. This procedure should also be applicable for beef, pork and lamb.

Effects of Dietary Patterns on Diseases and Behavioral Changes. The results of human dietary mineral intake studies at Alcorn State University emphasize that the use of dairy products is essential to improving calcium intake. Other results showed that phosphorus intake was most adequate among the nutrients studied. The average iodine and zinc intake were one-half of the Recommended Dietary Allowance (RDA). Iron intake was far below the RDA for females under age 50. Although copper intakes were lower than the requirement, this is supported by many other studies. The fluoridation of water is urgent for the prevention of dental cavities among the residents of the area studied. The average intakes of manganese, selenium, and molybdenum were adequate. Intakes of potassium and sodium fell within recommended dietary allowance levels, and the ratio of potassium to sodium seemed to be adequate. The young age group had greater intakes for a few of the minerals studied than their respective older counterparts. The study suggests that a careful selection of appropriate foods is essential for the improvement of nutrient intakes.

Impact of Type A School Lunch on Nutrient Intake. Research at Lincoln University (Missouri) has shown that the school lunch program significantly improved the nutrient intake of junior high girls who consumed Type A lunch, but that about 40 percent of those to whom it was available ate less than the Type A requirement or none of it. Food records were collected for 298 girls, 11-15 years of age in three Kansas City junior high schools; 170 had eaten a lunch meeting the requirements (at least 3 items from a selection among 2 ounces of meat or meat alternate, 1 serving of bread or alternate, 8 ounces of milk, and 3/4 cup fruit or vegetable). On a 24-hour basis, this group consumed significantly more energy, protein, fat, calcium, iron, riboflavin and niacin than did the others, including over one-third of the recommended dietary allowance for protein, calcium and riboflavin from the lunch. On the other hand, thiamine, vitamin A and vitamin C intakes were not increased over those of the non-Type A lunch group. Since vitamin A is often deficient in adolescent diets, more food sources of this nutrient in school lunch menus would seem to be desirable.

Manufactured Housing to Meet the Needs of Low Income Families. Housing research at North Carolina A&T State University has focused on alternative methods for providing more people in rural North Carolina with better housing. Traditionally, the single-family house has been the most predominant form of housing in America. In recent years rising costs have forced low and lower middle income consumers to forego their preference and

consider alternative types of housing which they can better afford. Mobile homes, which are relatively low-cost yet comparably equipped to the conventionally built house, may represent an important potential source of housing to consumers who desire but cannot afford, conventional home ownership. Previous studies have shown a reluctance among some families to move into a mobile home, and some do not feel mobile home living would improve their housing situations. However, few differences were found in the housing satisfaction, social and economic characteristics, or the homeowners' perception of their living situation when 175 mobile home owners and 163 conventional home owners were surveyed in North Carolina. These results suggest that assumed past differences may not reliably discriminate between the homeowners and that mobile homes represent a viable alternative as low cost housing. The findings of this study have been publicized through a technical bulletin and a folder type publication, "Sizing Them Up", designed for consumer usage. The response by the manufactured housing industry and the agricultural extension agents to this consumer oriented publication has shown tremendous success in disseminating information relative to a housing alternative and helping meet the challenge of finding improved methods to provide more people in rural North Carolina with better housing.

Cooperatives for Low-Income Farmers. North Carolina has a high proportion of small farms, when a small farm is defined in terms of gross value of products sold. The modal value of those farm sales of agricultural products in North Carolina in 1974 was less than \$2,000. This category included 33.5 percent of all farms in the State. Furthermore, according to the 1970 Census of Population, 22.5 percent of all farm families were classified as living in poverty, while the situation for black farm families was 45.5 percent below the poverty level. Research was carried out to ascertain the feasibility of forming marketing and selling cooperatives which would contribute to improvement in incomes for these farm families. It was found that a tobacco marketing cooperative would be a highly feasible proposition. There was no conclusive evidence that a grain marketing co-op would be feasible. However, a purchasing cooperative for farm inputs was also found to be highly feasible. The findings of the research can be used by farmers in order to market tobacco cooperatively and purchase farm inputs cooperatively, thus increasing their incomes and assisting in alleviating farm poverty.

SPECIAL RESEARCH GRANTS

The Special Research Grants program concentrates on problems of national interest beyond the normal emphasis in the formula program.

Following is a description of current activities and selected examples of accomplishments from these appropriated funds:

Current activities: In fiscal year 1983 under the Special Research Grants program, grants will be made to the four regional leader laboratories and the headquarters laboratory to continue the pesticide clearance and minor use animal drugs research program (New York, Michigan, Florida, California, and New Jersey) and to continue the on-going pesticide impact assessment program. Each of the agricultural experiment stations in Idaho, Oregon and Washington will receive a grant to continue the research on soil erosion supported under this authorization. A grant involving 16 states also will be made to continue the program of research in food and agriculture policies. Grants will also be made in the areas of guayule research, germplasm resources, integrated pest management, and tropical and subtropical research.

Included under the Special Research Grants program are grants for alcohol fuels authorized by Section 1419 of Public Law 95-113 and Native Latex grants authorized by Public Law 95-592. In fiscal year 1983 Special

Research Grants will be awarded competitively, utilizing peer panels of scientists to evaluate the scientific merit of proposals in the areas of soybeans, animal health, food quality and safety, aquaculture, antidesertification, and alcohol fuels research. Solicitation of applications for fiscal year 1983 grants to be awarded competitively will be published in the Federal Register. It is anticipated that grants will be awarded by August 1983.

In fiscal year 1982, 124 Special Research Grants were awarded competitively. Given below are details on the number of proposals submitted and the number of grants for each area.

<u>Specific Area Of Inquiry</u>	<u>Number of Preproposals Submitted</u>	<u>Annual Request</u>	<u>Number of Grants Awarded</u>	<u>Amount of Awards</u>
P.L. 89-106:				
Soybeans	47	\$4,274,226	6	\$502,460
Energy	70	5,148,788	13	931,200
Animal Health	451	52,424,287	75	6,941,320
Antidesertification	48	6,056,433	9	1,005,890
Aquaculture	90	6,495,319	9	502,460
Food Quality and Safety	19	1,550,410	5	372,480
P.L. 95-113:				
Alcohol Fuels	84	6,323,383	7	523,800

Selected examples of recent progress:

Progress in Preventing Grass Tetany in Cattle. Ohio College of Veterinary Medicine scientists cooperating with other scientists of Battelle Memorial Institute have successfully produced microcapsules containing magnesium metal powder and magnesium oxide. Magnesium is known to provide specific action against grass tetany of cattle; however, it is difficult to provide continuous administration of magnesium compounds at adequate levels required to prevent the disease in pastured cattle. The microcapsules containing magnesium are intended to control the release rate of magnesium over an extended period of several weeks when injected beneath the skin of cattle. It is anticipated that cattle can be protected from grass tetany by a single injection prior to being turned out on dangerous pastures. Grass tetany often involves up to thirty percent of a herd. It is present in all parts of the United States and causes millions of dollars in losses annually.

Toxic Substances Increase Disease Risks in Fish. Oklahoma scientists are studying the effects on catfish that may result from exposure to toxic material in aquaculture production. It has been found that stress in catfish from exposure to sublethal amounts of copper may cause a 30 percent greater infection rate from the protozoan disease agent Ichthyophthirius multifiliis. Findings such as this are important in understanding the interaction of toxicants and infection agents in producing disease in cultured fish. Losses from this protozoan disease are estimated at \$1 million a year.

Development of a Fluidized - Bed Corncob Combustor. A prototype furnace has been developed by Ohio State agricultural engineers which can burn corncobs without pollution, deliver more than 60 percent of the fuel energy as clean high temperature heated air, and completely eliminate the "plugging" problems of conventional furnaces. (Corncobs burn at such high temperatures that the residue melts and plugs up conventional equipment.) The small (75,000 Btu/hr; 22-30 kw) unit is a fluidized bed combustor. Tests of the combustor have proven its potential for a wide range of

energy uses, delivering very clean air at a controlled temperature of 1,250° F. When completely developed for home or farmstead heating, the fluidized bed combustor is expected to replace the 980 gallons of fuel oil used annually for space heating an average rural home in the northern Midwest by burning only 12 tons of corncobs. If only one-fourth of the corncobs grown in Ohio were used for heating, more than 60,000 homes could be heated and 58 million gallons of fuel oil could be saved each year. Nationally, if we burned 25 percent of the corncobs in this type combustor close to a million homes could be heated. A major advantage of the burner, which is now under refinement, is that it can burn many other kinds of fuel just as effectively and efficiently in completely controlled combustion. In addition, the combustor is expandable for such uses as space heating of non-residential buildings, crop drying, or as the energy source for generating electricity. Its potential is dependent only upon successful commercialization.

Soybean Pubescence Effects on Evapotranspiration and Photosynthesis.

Research at the Nebraska Agricultural Experiment Station showed that increased pubescence on soybean leaves and stems results in a reduction in evapotranspiration and an enhancement in canopy carbon dioxide exchange, thus resulting in improved water use efficiency. The dense pubescence also results in less reflection of light from the plant's surface than for normal pubescence and, therefore provides increased net radiation penetration deeper into the canopy. The dense pubescence isolines were more vigorous vegetatively and had more nodes and a greater leaf area, and outyielded the normal pubescence lines. This information should be useful in the development of soybean varieties.

Mineral Nutrition of Soybeans During Seed-Filling. Iowa State University researchers studied the effects of nitrogen, phosphorus, and potassium mobilization from the leaf and pod during the seed-filling stage of growth. They found that nitrogen from the leaves was more readily mobilized and translocated into the seed than it was from the pod and that it was correlated strongly with seed yield. This suggests that mobilization of leaf nitrogen is most useful in stress environments where nitrogen fixation may be depressed. Mobilization of leaf nitrogen was greater in late maturing lines, but showed no discernible relationship with nitrogen concentration in the seeds or with seed size. Leaves were three to four times more important than pods as sources of seed nitrogen and about twice as important as sources of phosphorus and potassium. Except for pod potassium, nutrients were withdrawn from both leaves and pods with up to 82 percent efficiency. The leaf nitrogen and phosphorus tended to be withdrawn with greater efficiencies with each successive stage of seed filling.

Integrated Pest Management. Integrated pest management programs resulting from a strong inter-disciplinary research program conducted by scientists in the Consortium-Integrated Pest Management (CIPM) project are being implemented on cotton farms in the Lower Rio Grande Valley of Texas. A multiple adversity resistant (MAR), short-season variety with resistance to cold, disease, and insects was incorporated into a dryland and irrigated cotton production system. Insecticides were applied only at economic threshold levels. The results of an economic evaluation clearly indicate increased net profits to farmers, primarily by reducing variable production costs. The Short Season/Integrated Pest Management Cotton System increased net profits above total costs by \$49.25 per acre when compared with conventional dryland cotton production systems. When compared with conventional irrigated production, it increased per acre net profit by \$182.95. In addition, insecticide applications were reduced by an average of six applications per acre, from seven under conventional systems to one under the short-season/IPM cotton production system.

Human Exposure Associated with Pesticide Use. Information on the exposure of humans to pesticides as a result of agricultural uses is being generated through research efforts in the National Agricultural Pesticide Impact Assessment Program. Human safety is a critical factor in decisions relating to maintaining pesticide registrations for agricultural uses.

Investigations in Arkansas, Texas, California, Florida, Indiana, Kansas, Missouri, Pennsylvania, Utah and Virginia have included determination of dermal contact, respiratory exposure through inhalation, blood and urine analyses, and the effects of alterations in clothing and application equipment on exposure levels. In these studies, actual exposure has been shown to be considerably less than that extrapolated from hypothetical situations, and in most situations, well within safety margins. However, certain tasks, such as mixing and loading, presented a higher risk of exposure and call for greater safety precautions. This research indicated that overall exposure levels can be substantially reduced by modification of application equipment, personal habits, and personal protective equipment.

COMPETITIVE RESEARCH GRANTS

The Competitive Research Grants program was initiated by the Department in 1978 to fund basic research in selected high priority areas related to plant production and human nutrition. The competitive grants complement the on-going research efforts of the USDA and the traditional agricultural research community by obtaining the participation of research scientists throughout the entire U.S. scientific community who have outstanding expertise in these related areas.

The following is a description of current activities and selected examples of accomplishments from these appropriated funds:

Current activities: Five targeted areas were identified as possessing great opportunities for scientific discoveries and for contributing to applied research vitally needed on important food problems. There are four target areas relating to crop productivity: photosynthesis, biological nitrogen-fixation, genetic mechanisms for crop improvement, and plant protection from biological stresses (e.g., insects, pathogens, viruses, and nematodes). The target area in human nutrition relates to establishing human nutrient requirements.

The Competitive Research Grants Office received research proposals in FY 1982 requesting about \$130 million for support of research in the targeted areas. From these proposals, 212 grants were made in the areas, for the amounts, and to the types of research organizations noted below. Approximately 20 percent of the dollars requested for research proposals that were rated good to excellent by the peer panels or ad hoc reviewers were funded. Given below are details on the number of proposals submitted, the number of grants awarded and the major categories of grantee organizations.

	<u>Proposals Received</u>	<u>Dollars Requested</u>	<u>Grants Awarded</u>	<u>Dollars Awarded</u>
Plant Biology				
Biological Stress	238	\$32,131,217	58	\$3,395,000
Genetic Mechanisms	154	27,445,045	52	3,821,800
Nitrogen Fixation	118	22,265,233	36	2,910,000
Photosynthesis	130	20,794,417	38	2,910,000
Subtotal	640	102,635,912	184	13,036,800
Human Nutrition				
Nutrient Requirements	140	27,429,454	28	2,793,600
TOTAL	780	130,065,366	212	15,830,400

	Proposals Received	Dollars Requested	Grants Awarded	Dollars Awarded
Land-Grant Universities	506	\$77,391,248	129	\$9,469,500
SAES	(409)	(61,165,110)	(100)	(7,342,100)
Non-SAES	(97)	(16,226,138)	(29)	(2,127,400)
Land-Grant 1890	6	516,181	- -	- -
Private Universities	70	16,328,289	20	1,686,800
Public Universities	112	21,335,961	30	2,235,000
Federal Laboratories	9	1,831,196	2	147,200
USDA/ARS	41	5,499,856	13	875,000
Private Non-Profit	28	5,607,625	18	1,416,900
Private Profit	4	750,531	- -	- -
State and Local Agencies	2	416,798	- -	- -
Other Public Foundations	- -	- -	- -	- -
Veterinary Colleges	2	387,681	- -	- -
TOTAL	780	130,065,366	212	15,830,400

Selected examples of recent progress:

Preventing Loss of Energy in Nitrogen Fixation. The reduction of nitrogen from the atmosphere to a form utilizable by plants occurs in certain bacteria, some of which live in a symbiotic relationship with the plant. The reaction is catalyzed by the enzyme, nitrogenase. Hydrogen gas is also produced during the course of the reaction resulting in a significant waste of energy. About 20 percent of the strains of Rhizobium japonicum, the nitrogen-fixing bacterium which infects soybeans, show a capacity to synthesize hydrogenase, an enzyme which can reoxidize molecular hydrogen (H₂) thus recovering some of the energy lost. Nodules that have good H₂ recycling capacity lose little or no H₂ to the atmosphere, whereas nodules that do not possess a good hydrogenase system lose a mean of about 32 percent of the energy supplied to the nodules as evolved H₂. No strain of bacterium which infects either clover or alfalfa has been identified which has sufficient hydrogenase to recycle a significant portion of the H₂ given off from nodules during nitrogen fixation. A group at Oregon State University has cloned the gene(s) for hydrogenase and has transferred cloned Rhizobium japonicum DNA in E. coli into a mutant which cannot make hydrogenase, converting it into a strain which has this capacity. They have shown that these bacteria effectively fixed nitrogen when used as inoculants for soybeans as well as expressing hydrogenase activity. Their ultimate goal is to transfer the hydrogenase gene(s) to strains of bacteria which infect clover and alfalfa.

Regenerating Whole Corn Plants from Small Groups of Cells. An important component in the development of genetic engineering in plants is the regeneration of whole plants that are fertile from single cells in culture. Single somatic (non-reproductive) cells undergo cell division and organization in culture culminating in the formation of embryos; the process is termed somatic embryogenesis. While the regeneration of whole plants via somatic embryogenesis has been described for many plant species, it is far from routine and remains one of the biggest hurdles in the utilization of plant genetic engineering techniques for practical purposes. The conditions for successful regeneration vary from one plant species to another, and in many cases, from one variety to another within the same species. The regeneration of whole plants from cell culture using the major agricultural crops, such as soybean, cotton and cereals, has proven to be particularly difficult. Recently, University of Minnesota scientists reported that they have developed methods to initiate rapidly growing corn tissue cultures which undergo somatic embryogenesis. They have also shown that these somatic embryos germinate readily and grow to be normal crop plants. This is the first report of a successful regeneration of whole plants in corn tissue culture. The origin of the tissue culture in this case was not a single cell but rather a part of an immature corn seed.

Nevertheless, the successful demonstration of somatic embryogenesis in corn tissue cultures clearly indicates the feasibility of the cell culture-plant regeneration approach to the development of effective means of genetically manipulating corn at the cellular level for breeding purposes.

Corn Mutations Used for Understanding How Genes are Transposed.

Transposable elements are pieces of DNA that move around the genome and cause mutations of the adjacent genes. They are found in all types of organisms, including bacteria, fungi, animals and higher plants. Transposable elements in maize are called controlling elements. Research in the 1940's and 1950's showed that maize controlling elements cause many distinguishable types of mutations, and more recently it has been shown that many of these mutations are the kind that alter the developmental timing of gene expression. Because of the extreme complexity of the events involving controlling elements, their biochemical or molecular nature had not been explored for decades. However, with advent of modern molecular biology techniques, it has become possible in recent years to study maize controlling elements at the molecular and biochemical levels. The Carnegie Institute of Washington at Baltimore now reports that they are on the verge of isolating a maize controlling element. This has never been done in higher plants, while transposable elements have been isolated and characterized in bacteria, yeast and fruit flies. The study of transposable elements is perhaps one of the most complex problems of modern molecular biology. Yet, the available evidence clearly suggests that transposable elements play fundamental roles in mutation as well as the normal expression of genes. The research on transposable elements will ultimately lead to the understanding of the evolution of genes on the theoretical level, and on the applied level, the stable introduction of new genes into important crop plants such as maize.

How Leaves Make Their Own Photosynthetic Apparatus. Scientists at Cornell University have found that the plant leaf cell's own protein synthesizing system can be duplicated in vitro. This accomplishment allowed them to establish that light is required for the formation of the specific proteins needed for development of the photosynthetic complex in a growing leaf. They have also found that the particles (ribosomes) within the cell on which proteins are made become bound to photosynthetic membranes in the light. These experiments indicate that light is not only essential for photosynthetic activity but also necessary for control of growth and development of the photosynthetic system in growing plants. The results provide a further step in understanding how the leaf synthesizes its own photosynthetic machinery.

A Natural Repellent for Apple Maggots. The apple maggot is one of the most serious pests of apple and other tree fruits in the United States. Millions of dollars are spent annually on pesticide applications to control the pest. An investigator at the University of Massachusetts has been investigating the behavior of the apple maggot fly and has uncovered key information that may lead to new environmentally safe control procedures. Because only a limited number of flies can develop on an apple fruit, females leave a chemical scent on the apple after laying her eggs. This odor inhibits other apple maggot flies from laying their eggs on the apple thereby preventing overcrowding and fatal competition. The investigator is on the verge of identifying this chemical repellent. These and other studies have convinced the investigator that this chemical in conjunction with other techniques he has devised will lead to effective, inexpensive, and safe measures to control apple maggot and result in high quality apples and other fruit.

Bioavailability of Trace Element Supplements in Infant Formulas. The Academy of Pediatrics recommends iron supplementation of infants. The optimum vehicle for supplementation with regard to increasing the infants' iron stores and minimizing potential negative effects by the supplement on other nutrients has not been agreed upon. Researchers at the University of California have studied the effectiveness of both inorganic salt and chelating agents. Their results shown that chelates may be superior to an inorganic salt in increasing tissue iron stores; thus, the actual amount of iron given to the infant may be reduced, decreasing possible negative properties of iron supplement such as oxidation of nutrients and interference with absorption of other trace elements such as manganese, zinc and copper.

ANIMAL HEALTH AND DISEASE RESEARCH

The Animal Health and Disease Research (Section 1433, Public Law 95-113) formula program is directed to improving the health and productivity of animals and the welfare of producers and consumers of animal products; protecting human health through control of animal diseases transmissible to humans; minimizing livestock and poultry losses due to transportation and handling; and facilitating the effective treatment and prevention of animal diseases.

The following is a description of current activities and selected examples of accomplishments from these appropriated funds:

Current activities: Fiscal year 1982 is the fourth year in which the Section 1433 program has been active. Institutions receiving FY 1982 funds include 40 State Agricultural Experiment Stations and 16 Colleges of Veterinary Medicine qualifying individually; 11 such Stations and Colleges qualifying as combined institutions and one College of Medicine (John Hopkins University). The latter institution became ineligible for funding on enactment of the Agriculture and Food Act of 1981. Legislative amendments contained in Public Law 97-98, December 22, 1981, provide that an "eligible institution" for Animal Health and Disease Research funds "means an accredited school or college of veterinary medicine or a State agricultural experiment station that conducts animal health and disease research."

Recommendations of the Animal Health Science Research Advisory Board are being followed in program implementation (i.e., scope and priorities of eligible research, determination of research capacity of eligible institutions and other questions on program administration). In accordance with advice of the Board, emphasis in this research centers on the solution of high priority diseases or other animal health hazards in the production of livestock, poultry, and aquaculture species.

State Comprehensive Plans for animal health research, approved by CSRS are being followed by the eligible institutions within each State. These plans include the major areas of animal health research to be conducted by the institutions and mechanisms to assure effective coordination of research among the institutions. Provisions of Section 1433 project implementation permits selection of studies within each State based on highest priority needs and capabilities of the institutions to conduct the needed research.

Research is in progress on more than 400 projects seeking solutions to infectious and noninfectious disease or parasite problems of food animals and horses. Strong emphasis is being placed on solution to respiratory, enteric and reproductive diseases. Other major problems such as mastitis, pseudorabies, brucellosis and pinkeye are being investigated. Causes of disease are under study; new methods for

disease diagnosis and carrier detection are being sought; new or improved treatments are being tested; methods of increasing resistance to disease are being developed; and biological methods to replace chemical control of livestock insects and internal parasites are being evaluated.

More than 80 projects were new in fiscal year 1982, providing re-direction of effort toward particularly promising approaches. These new research efforts are being applied to solve problems such as mastitis, reproductive diseases (including brucellosis), respiratory diseases and gastrointestinal diseases. New or improved vaccines are being developed to control these diseases and other high priority problems such as bovine leukemia, salmonellosis, bluetongue and TGE. New medical technology including genetic engineering, monoclonal antibody and virus fingerprinting procedures are being employed to accelerate needed breakthroughs.

Selected examples of recent progress:

Prevention of Respiratory Disease in Turkeys. Research by Minnesota scientists has shown that turkeys can be effectively protected against influenza by using an inactivated vaccine which these scientists have developed. Influenza is one of the major causes of respiratory disease in turkeys and in Minnesota alone losses are from one to five million dollars annually from the disease. The new vaccine has been tested in market birds and breeder hens with little or no side effects. The vaccine is now commercially available and will protect against the clinical disease. Many turkey flocks are now being protected by this vaccine in Minnesota.

New Treatment for Molybdenosis in Cattle. Nevada scientists are making substantial progress to develop an improved method of administering copper supplement to cattle. Many cattle in western states require a copper supplement to prevent a deficiency disease known as molybdenosis. As a result of previous studies 30,000 Nevada cattle have been given a long acting supplement of copper glycinate, but some undesirable side reactions may occur from this preventative treatment. An improved injectable and long acting supplement has shown much promise in preliminary tests and further evaluations are planned to assure the effectiveness and safety of this new treatment.

Prevention of Caseous Lymphadenitis. Prevention of caseous lymphadenitis of sheep and goats is one step nearer because of research conducted by Texas scientists. They have found that a toxin is produced by the causative agent, but only at certain stages of the growth cycle of this disease organism. The toxin appears to play an important role in determining whether this bacterial agent can cause disease. These findings have special significance for development of an effective vaccine and may explain the unreliability of those presently available. Correct timing in harvest of bacterial cultures appears critical for securing optimum amounts of the toxin needed for vaccine production. Caseous lymphadenitis is widespread in sheep flocks in the western range States and causes many deaths and condemnations of carcasses at slaughter.

Vaccine Developed for Pale Bird Syndrome. Researchers in the Georgia Veterinary Medical Experiment Station have developed a vaccine which has proven effective in prevention of pale bird syndrome. This condition is also termed malabsorption syndrome, helicopter disease or infectious stunting, and is probably at present the most economically important disease in U.S. broilers. The new vaccine has been tested extensively in laboratory and field trials. Vaccinated broilers are resistant to clinical signs of pale bird syndrome. They grow better and have better feed conversions and lower condemnation rates than broilers from unvaccinated flocks. It is

estimated that as much as 10 percent of the broiler production in Georgia is affected by the disease. Reduction of the effects of this disease through vaccination will save millions of dollars annually.

New Test for Pseudorabies in Swine. Recently completed studies at the University of Pennsylvania, School of Veterinary Medicine indicate that a newly developed DNA fingerprinting technique can accurately distinguish and identify individual strains of pseudorabies virus of swine. Surveys carried out by the USDA have shown that pseudorabies virus infections of swine have rapidly increased in recent years, and that up to 8 percent of swine in the USA may be infected with this virus. Until now it has not been possible to distinguish between the numerous strains of pseudorabies virus. The DNA fingerprinting method identifies strain specific markers and, for the first time, makes it possible to accurately trace sources of infection, and to distinguish field strains of virus from live attenuated vaccine strains. Thus, DNA fingerprinting of pseudorabies virus provides a powerful new epidemiologic tool which makes possible studies which will greatly aid in the control and eradication of this disease.

Detection of Sarcocystis Parasites in Cattle. Oklahoma scientists have developed a sensitive, accurate procedure known as the fluorescent antibody test to detect cattle infected with sarcocystis, a microscopic protozoan parasite. Surveys made with this new test indicate that over half the cattle in Oklahoma may harbor the parasite. This agrees with previous detection methods that could be made only after slaughter. Detection of the parasite in the living animal will permit studies on epidemiology, clinical effects, and feasibility of controlling this parasite. Possible human health hazards from consumption of this parasite in uncooked meat makes control particularly desirable.

EXTENSION SERVICE

Purpose Statement

Cooperative extension work was established by the Smith-Lever Act of May 8, 1914, as amended. The legislation authorizes the Department of Agriculture to give, through the land-grant colleges, instruction and practical demonstrations in agriculture and home economics and related subjects and to encourage the application of such information by demonstrations, publications, and other means to persons not attending or resident in the colleges. This work is further emphasized in Title XIV (National Agricultural Research, Extension, and Teaching Policy) of the Food and Agriculture Act of 1977, as amended by the Agriculture and Food Act of 1981.

State and county extension offices in each State, the District of Columbia, Puerto Rico, the Virgin Islands, Guam, American Samoa, the Northern Marianas and Micronesia conduct educational programs to fulfill these requirements.

The Extension Service within the U.S. Department of Agriculture administers extension work nationally. As of September 30, 1982, there were 176 full-time permanent employees and 14 other than full-time permanent employees, all located in the D.C. Metropolitan Area.

EXTENSION SERVICE

Available Funds and Staff-Years

1982 Actual and Estimated, 1983 and 1984

Item	1982		1983		1984	
	Actual		Estimated		Estimated	
	Amount	Staff-Years	Amount	Staff-Years	Amount	Staff-Years
Extension Service.....	315,336,000:	192	328,654,000:	178	287,082,000:	178
Obligations under other USDA						
appropriations:						
Agricultural Stabilization and						
Conservation Service:						
Rural Clean Water Project.....	432,611:		495,000:		495,000:	
Nat'l Water Quality Evaluation.....	- - :		400,000:		300,000:	
Colorado River Salinity.....	- - :		200,000:		300,000:	
Animal and Plant Health Inspection						
Service-Pest Monitoring Service....	247,374:		- - :		- - :	
Farmers Home Administration:						
Counseling Housing Applicants.....	49,320		55,000:		55,000:	
Farm Management Assistance.....	93,500:		107,000:		107,000:	
Federal Crop Insurance Corporation-						
Computer Model for Risk Evaluation	202,200:		150,000:		150,000:	
Food Safety and Inspection Service-						
Residue Avoidance program.....	1,470,219:		1,619,000:		1,619,000:	
Forest Service-Boundary Waters Canoe						
Area.....	144,000:		165,000:		165,000:	
Soil Conservation Service-Water						
Quality.....	58,950:		40,000:		40,000:	
Miscellaneous Agencies:						
Rural Development Committee.....	165,720:		190,000:		190,000:	
Total, Other USDA Appropriations	2,863,894:		3,421,000:		3,421,000:	
Total Agricultural Appropriations	318,199,894:		332,075,000:		290,503,000:	
Other Federal Funds:						
Reimbursements:						
AID-PASA	216,628:		247,000:		247 000:	
Department of Energy-Solar Drying						
of Crops.....	192,683:		- - :		- - :	
Department of Interior:						
Improving Water Management Practices:	20,000:		23,000:		23,000:	
Fish and Wildlife Recognition						
Program.....	6,369:		7,000:		7,000:	
Technology Transfer for Water						
Resources Programming.....	19,872:		20,000:		20,000:	
Environmental Protection Agency:						
Non-point water quality management.	26,352:		80,000:		80,000:	
Pesticide Aerial Application.....	80,000:		91,000:		91,000:	
Pesticide Application Training	1,062,010:		1,212,000:		1,212,000:	
Pesticide Safety Information.....	100,000:		114,000:		114,000:	
Water Quality Training.....	3,023:		30,000:		30,000:	
Wildlife Damage Handbook.....	9,800:		11,000:		11,000:	
Navy-Home Economics for Families....	43,473:		49,000:		49,000:	
Total, Other Federal Funds...	1,780,210:		1,884,000:		1,884,000:	

Item	1982	1983	1984
	Actual	Estimated	Estimated
	Amount	Staff- Years	Staff- Years
Non-Federal Funds:			
Federal Building Fund-Administrative:			
Services to States.....	349,391	399,000	399,000
Federal Assistance Program			
Retrieval-Administrative Services to:			
States.....	50,000	57,000	57,000
Federal Telecommunications Systems-			
Administrative Services to States..	196,398	225,000	225,000
Cost Share Printing-Administrative			
Services to States.....	8,338	9,000	9,000
State Extension Specialists-Access			
OASIS data base.....	4,000	5,000	5,000
Total, Non-Federal Funds.....	608,127	695,000	695,000
Total, Extension Service.....	320,588,231	192 : 334,654,000	178 : 293,082,000

	1982 Actual	1983 Estimated	1984 Estimated
Full-Time Equivalent Staff-Years:			
Ceiling.....	191	177	177
Non-ceiling.....	1	1	1
Total.....	192	178	178

EXTENSION SERVICE

Permanent Positions by Grade and Staff-Year Summary

1982 and Estimated 1983 and 1984

GRADE	1982 HEADQUARTERS/TOTAL	1983 HEADQUARTERS/TOTAL	1984 HEADQUARTERS/TOTAL
ES-5	1	1	1
ES-4	4	4	4
ES-3	1	1	1
ES-2	1	1	1
ES-1	1	1	1
GS/GM-15	35	35	35
GS/GM-14	37	37	37
GS/GM-13	13	13	13
GS-12	10	9	9
GS-11	6	5	5
GS-9	9	9	9
GS-8	9	9	9
GS-7	14	13	13
GS-6	45	45	45
GS-5	11	10	10
GS-4	4	4	4
GS-3	1	1	1
GS-2	1	1	1
GS-1	2	1	1
Total, Permanent Positions:	205	200	200
Staff-Years:			
Ceiling	191	177	177
Non-ceiling	1	1	1
TOTAL	192	178	178

EXTENSION SERVICE

CLASSIFICATION BY OBJECTS

1982 and Estimated 1983 and 1984

	<u>1982</u>	<u>1983</u>	<u>1984</u>
Personnel Compensation:			
11 Total personnel Compensation..a/	\$5,926,917	5,540,000	5,689,000
12 Personnel Benefits	<u>26,592,057</u>	<u>27,185,000</u>	<u>28,458,000</u>
Total Pers. Comp. & Benefits.....	<u>32,518,974</u>	<u>32,725,000</u>	<u>34,147,000</u>
Other Objects:			
21 Travel.....	555,311	583,000	611,000
22 Transportation of things.....	12,242	17,000	18,000
23.2 Communications, utilities and other rent.....	17,079,386	17,433,000	17,492,000
24 Printing and reproduction.....	267,580	298,000	313,000
25 Other services.....	2,888,091	3,174,000	1,883,000
26 Supplies and materials.....	129,221	159,000	167,000
31 Equipment.....	281,647	300,000	315,000
41 Grant subsidies and contributions....	<u>261,192,096</u>	<u>273,965,000</u>	<u>232,136,000</u>
Total other objects...	<u>282,405,574</u>	<u>295,929,000</u>	<u>252,935,000</u>
Total direct obligations	<u>314,924,548</u>	<u>328,654,000</u>	<u>287,082,000</u>
Position Data:			
Average Salary, ES positions.....	57,615	61,758	61,758
Average Salary, GS positions.....	29,922	29,940	29,940
Average Grade, GS positions.....	10.13	10.21	10.21

a/ All Employees are employed in Headquarters

EXTENSION SERVICE

The estimates include appropriation language for this item as follows
(new language underscored; deleted matter enclosed in brackets):

Extension Service

- Payments to States, Puerto Rico, Guam, the Virgin Islands, American Samoa and Micronesia: For payments for cooperative agricultural extension work under the Smith-Lever Act, as amended by the Act of June 26, 1953, the Act of August 11, 1955, the Act of October 5, 1962 (7 U.S.C. 341-349), section 506 of the
- 1 act of June 23, 1972, and the Act of September 29, 1977 (7 U.S.C. 341-349), as
amended, and section 1361(c) of the Act of October 3, 1980 (7 U.S.C. 301n.) to
be distributed under section 3(b) and 3(c) of the Act, for retirement and
employees' compensation costs for extension agents, and for costs of penalty
mail for cooperative extension agents and State extension directors,
- 2 \$230,376,000; payments for the nutrition and family education program for
low-income areas under section 3(d) of the Act, [\$60,354,000; payments for the
urban gardening programs under section 3(d) of the Act, \$3,000,000; payments
for the pest management program under section 3(d) of the Act, \$7,531,000;
payments for the farm safety program under section 3(d) of the Act,
\$1,020,000; payments for the pesticide impact assessment program under section
3(d) of the Act, \$1,716,000; payments for carrying out the provisions of the
Renewable Resources Extension Act of 1978, \$2,000,000] \$34,821,000; payments
for extension work under section 209(c) of Public Law 93-471, \$983,000;
payments for extension work by the colleges receiving the benefits of the
- 3 second Morrill Act (7 U.S.C. 321-326, 328) and Tuskegee Institute under section
1444 of the National Agricultural Research, Extension and Teaching Policy Act
4 of 1977 (Public Law 95-113), as amended, \$16,241,000; in all, [\$323,221,000,
of which not less than \$79,400,000 is for Home Economics] \$282,421,000:
Provided, That funds hereby appropriated pursuant to section 3(c) of the Act
of June 26, 1953, and section 506 of the Act of June 23, 1972, as amended,
shall not to be paid to any State, Puerto Rico, Guam, or the Virgin Islands,
American Samoa, and Micronesia prior to availability of an equal sum from
non-Federal sources for expenditure during the current fiscal year.
- Federal administration and coordination: For Administration of the
Smith-Lever Act, as amended by the Act of June 26, 1953, the Act of August 11,
1955, the Act of October 5, 1962, section 506 of the Act of June 23, 1972,
section 209(d) of Public Law 93-471, and the Act of September 29, 1977, (7
- 5 U.S.C. 341-349), as amended, and section 1361(c) of the Act of October 3, 1980
(7 U.S.C. 301n.), and to coordinate and provide program leadership for the
6 extension[and higher education work]of the Department and several States and
7 insular possessions, [\$5,451,000, of which not less than \$2,300,000 is for
Home Economics] \$4,661,000. (Public Law 97-370, making appropriations for
Agriculture, Rural Development, and Related Agencies, 1983).

The first and fifth changes are for the purpose of providing language for the Agriculture and Food Act of 1981 (PL-97-98) which amended the 1977 Farm Bill.

The second change is for the purpose of deleting language providing earmarked funding for the Urban Gardening, Pest Management, Pesticide Impact Assessment Programs and programs funded under the Renewable Resources Extension Act. Earmarked funding for these programs is not proposed in fiscal year 1984.

The third change is for the purpose of restoring authorization for Extension programs carried out by the 1890 Colleges and Tuskegee Institute. This was inadvertently deleted from the FY 1983 Appropriations Bill.

The fourth & seventh changes are for the purpose of deleting the limitation in the FY 1983 Appropriation Act on the level of support for Extension's Home Economics program. This limitation conflicts with the primary intent of the Smith-Lever Act giving maximum flexibility to the State Cooperative Extension Services in determining programs needing attention in the respective States.

The sixth change is for the purpose of deleting language pertaining to the higher education work of the Department. This effort is now coordinated under the Agricultural Research Service.

EXTENSION SERVICE

Appropriation Act, 1983.....	\$328,672,000
Budget Estimate, 1984.....	287,082,000
Decrease in Appropriation.....	<u>-41,590,000</u>

Adjustments in 1983

Appropriation Act, 1983.....	\$328,672,000	
Activities transferred to Office of the Secretary.a/	-18,000	
Adjusted base for 1983.....		328,654,000
Budget Estimate, 1984.....		287,082,000
Decrease from adjusted, 1983.....		<u>-41,572,000</u>

a/ Pursuant to Section 1414, Public Law 97-98 an Assistant Secretary, Science and Education has been established. Actual transfer of funds of \$18,000 is anticipated in FY 1983. On a comparable basis, the full annual costs of this operation including pay costs is \$18,000 for 1983 and \$18,000 for 1984.

SUMMARY OF INCREASES AND DECREASES
(On basis of adjusted appropriation)

<u>Item of Change</u>	<u>1983 Estimated</u>	<u>Program Changes</u>	<u>1984 Estimate</u>
Smith-Lever Sections 3(b) & (c).....	\$230,376,000	- -	\$230,376,000
Smith-Lever Section 3d:			
Pest Management.....	7,531,000	-\$7,531,000	- -
Farm Safety.....	1,020,000	-1,020,000	- -
Urban Gardening.....	3,000,000	-3,000,000	- -
Food and Nutrition Education.....	60,354,000	-25,533,000	34,821,000
Pesticide Impact Assessment.....	1,716,000	-1,716,000	- -
1890 Colleges and Tuskegee Institute...	16,241,000	- -	16,241,000
Renewable Resource Extension Act.....	2,000,000	-2,000,000	- -
D. C. Extension.....	983,000	- -	983,000
Federal Administration & Coordination..	5,433,000	<u>-772,000</u> ^{a/}	<u>4,661,000</u>
Total, Available.....	<u>328,654,000</u>	<u>-41,572,000</u>	<u>287,082,000</u>

a/ Includes \$339,000 for the portion of Federal pay increases absorbed in FY 1983 necessary to carry out the programs in FY 1984.

PROJECT STATEMENT
(On basis of adjusted appropriation)

Project	1982		1983		Increase or Decrease	1984	
	Actual	Staff	Estimated	Staff		Estimated	Staff
	Amount	Years	Amount	Years		Amount	Years
I. Payments to States:							
a. Smith-Lever Act:							
(1) Sections 3b & c							
Program.....	\$214,223,483	--	\$224,892,880	--	- -	\$224,892,880	--
Set-aside for							
Federal Admin-							
istration (4%)..	5,043,120	- -	5,483,120	- -	- -	5,483,120	- -
Subtotal, Sections							
3b & c.....	219,266,603	--	230,376,000	--	- -	230,376,000	--
(2) Section 3(d);							
Program:							
Food and Nutri-							
tion (EFNEP)...	60,140,520	- -	60,140,520	- -	-\$25,319,520	34,821,000	- -
Pest Management..	7,531,000	- -	7,531,000	- -	-7,531,000	- -	- -
Farm Safety.....	1,020,000	- -	1,020,000	- -	-1,020,000	- -	- -
Pesticide Impact:							
Assessment.....	1,850,000	- -	1,716,000	- -	-1,716,000	- -	- -
Urban Gardening..	3,000,000	- -	3,000,000	- -	-3,000,000	- -	- -
Energy.....	324,000	- -		- -	- -	- -	- -
Nonpoint source							
pollution.....	696,130	- -	- -	- -	- -	- -	- -
Set-aside for							
Federal Admin-							
istration (4%)..	213,480	- -	213,480	- -	-213,480	- -	- -
Subtotal, Section							
3(d)	74,775,130	- -	73,621,000	- -	-38,800,000(1)	34,821,000	- -
Total, payments under							
the Smith-Lever Act...	294,041,733	155	303,997,000	147	-38,800,000	265,197,000	147
b. Payments under							
Renewable Re-							
sources Ext-							
ension Act.....	2,000,000	- -	2,000,000	- -	-2,000,000(2)	- -	- -
c. Payments to the							
District of							
Columbia:							
Program.....	943,680	- -	943,680	- -	- -	943,680	- -
Set-aside for							
Federal Admin-							
istration (4%)..	39,320	--	39,320	--	- -	39,320	--
Total, payments to							
the District of							
Columbia.....	983,000	1	983,000	1	- -	983,000	1

Project	1982 Actual		1983 Estimated		Increase or Decrease	1984 Estimated	
	Amount	Staff: Years	Amount	Staff: Years		Amount	Staff: Years
d. Payments to 1890 Colleges and Tuskegee Institute:							
Program.....	11,751,360	--	15,591,360	--	- -	15,591,360	--
Set-aside for Federal Administration (4%)	489,640	--	649,640	--	- -	649,640	--
Total, payments to 1890 Colleges and Tuskegee Institute	12,241,000	2	16,241,000	2	- -	16,241,000	2
3. Federal Administration and Coordination (Direct Appropriation).....	5,658,815	34	5,433,000	28	-772,000 (3)	4,661,000	28
Unobligated balance	411,452	--	- -	--	- -	- -	--
Total available or estimate.....	315,336,000	192	328,654,000	178	-41,572,000	287,082,000	178
Transfer to Office of Secretary.....	+17,000		+18,000				
SLUC & Advisory Committees.....	+349,000		--				
Total Appropriation	315,702,000		328,672,000				

Explanation of Program

Appropriations for the Extension Service enable the U. S. Department of Agriculture to perform its partnership role with State and local counterparts to carry out cooperative Extension Work for the benefit of our Nation's farmers and ranchers, and agricultural industries, rural and urban communities, families and youth, and the ultimate consumers of agricultural goods and services.

Cooperative Extension work is authorized under the Smith-Lever Act of 1914, as amended; the Rural Development Act of 1972, as amended; and the District of Columbia Public Postsecondary Education Reorganization Act. The National Agricultural Research, Extension and Teaching Policy Act Amendments of 1981 (Title XIV of the Agriculture and Food Act of 1981) also authorize the Federal Government, States and Counties to implement cooperative Extension programs commensurate with needs stemming from changes in U.S. agricultural practices and the world food and agricultural situation.

The Extension Service, an agency in USDA, is a legislated partner in the cooperative effort with each State, the District of Columbia, Puerto Rico, Guam, the Virgin Islands, American Samoa, the Northern Marianas, and Micronesia. The national staff provides leadership and coordinates the Extension program by:

- Serving as a liaison between USDA and the State Cooperative Extension Services, providing program leadership and assistance to the States in the conduct of Extension work;
- Administering Federal laws authorizing Extension work and coordinating the work among the States; and
- Providing leadership for the educational phase of all programs under the jurisdiction of USDA.

The Federal Staff provides leadership to and coordinates the work of approximately 17,000 State, area, and County Cooperative Extension Service personnel (full-time equivalents) employed throughout the United States. Extension work in States and Counties is financed from Federal, State, County and local sources and is jointly planned with ES-USDA to provide educational programs adapted to local problems and conditions. Extension helps people identify and solve their farm, home, and community problems through use of research findings of the U.S. Department of Agriculture and the State Land-Grant colleges and universities.

JUSTIFICATION OF INCREASES AND DECREASES

Overview. The reductions proposed for earmarked Extension programs are based on the need to set priorities within the increasingly constrained Federal budget. The proposed reductions are not a reflection on the success of the earmarked programs in meeting their goals. Within the constrained overall funding levels, the Department is requesting that the Smith-Lever 3(b&c) formula be maintained, since it provides maximum flexibility to the States in meeting their particular program needs.

(1) A decrease of \$38,800,000 in payments to States for specifically earmarked programs funded under Section 3(d) of the Smith-Lever Act consisting of:

(a) A decrease of \$25,533,000 in the Expanded Food and Nutrition Education Program (EFNEP) (\$60,354,000 available in FY 1983).

Need for Change. The Expanded Food and Nutrition Education Program (EFNEP) was initiated in FY 1969 to provide low-income families with improved nutritional knowledge and practices necessary to maintain adequate diets. The program has also been used to assist families participating in various food assistance programs such as the Food Stamps and the Women, Infants and Children (WIC) programs for more effective use of foods obtained through these programs. EFNEP increases the homemakers' ability to select and buy food, prepare and serve balanced meals, improve practices in food storage, safety, and sanitation and to manage food-related resources such as gardens and food stamps.

Studies of this program indicate improvement in the nutritional knowledge and practices among participating families. To date, the program has reached 2 million families and 5 million youth in an in-depth and one-on-one nutrition education program concept.

At the FY 1983 funding, the program is expected to reach approximately 300,000 families and 600,000 urban youth per year, out of the 5 million eligible families living in poverty.

Nature of Change. Current funding distribution and program objectives will be retained. However, States will be given maximum flexibility in tailoring the program according to their specific needs. For example, the current program requirement to focus 20% of total resources for youth clientele would be waived and States will be encouraged to refocus programs according to their specific clientele needs.

(b) A decrease of \$7,531,000 for the Integrated Pest Management (IPM) Programs (\$7,531,000 in FY 1983.)

Need for Change. This reduction is proposed because of the growth and acceptance of IPM during the past several years. Private enterprises are expected to meet, to some degree, producer demand for continuation of services initiated by Extension. The States could also, at their discretion redirect other Federal, State, and County funds for this purpose.

Nature of Change. This proposal will eliminate specifically earmarked funds for Integrated Pest Management under Section 3(d) of the Smith-Lever Act.

- (c) A decrease of \$1,020,000 to eliminate earmarked funding for Farm Safety (\$1,020,000 available in FY 1983).

Need for Change. The main purpose of providing earmarked funding is to focus attention on a specific problem that has National implications. The Department feels that this objective has been accomplished in the farm safety program. The importance of the farm safety program has been demonstrated, with some one-half of the States able to continue to provide this type of assistance even without this specific funding. In comparison, only 8 States were conducting this program prior to the initiation of this specific funding in 1975.

Nature of Change. This proposal will eliminate specifically earmarked funds for farm safety under Section 3(d) of the Smith-Lever Act.

- (d) A decrease of \$1,716,000 for the National Agricultural Pesticides Impact Assessment Program (NAPIAP) (\$1,716,000 available in FY 1983).

Need for Change. This proposal is in line with the Administration's general reductions in government spending. With this reduction, cost-benefit use information for registration or reregistration of pesticides required under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) will have to be partially obtained from private industry sources and the redirection of other Federal and State funds where appropriate.

Nature of Change. This proposal eliminates specifically earmarked funds for CES NAPIAP under Section 3(d) of the Smith-Lever Act. The current USDA State Land-Grant University National Agricultural Pesticide Impact Assessment Program will be modified to enable industry to work more closely with the impact assessment system to meet standards set forth in FIFRA for registration of current and newly developed pesticides.

- (e) A decrease of \$3,000,000 to eliminate the Urban Gardening Program (\$3,000,000 available in FY 1983).

Need for Change. The Urban Gardening Program, currently being carried out in 16 major cities was initiated in 1977. The purpose of the program is to teach home food production and utilization skills to low-income inner city dwellers. The program has been very successful in achieving its purpose. Large numbers of volunteers have given this program a large outreach in the cities. Through this program, proper attention has been focused on urban gardening and product storage and utilization. This particular initiative is being proposed for termination since the Department believes that the earmarked funds have accomplished the objectives of the program.

Nature of Change. This proposal would eliminate specifically earmarked funds for this program under Section 3(d) of the Smith-Lever Act.

- (2) A decrease of \$2,000,000 to eliminate funding for the Renewable Resources Extension Act (P.L. 95-306) (\$2,000,000 available in FY 1983).

Need for Change. The Renewable Resources Extension Act was enacted to provide for an expanded and comprehensive extension education program for forest and rangeland renewable resources. However, even before this Act, State Extension Services had begun a modest expansion of these educational programs. States that have placed a high priority on forest and rangeland renewable resources will have the flexibility to use non-targeted funds to further expand these educational programs.

Nature of Change. This proposal will eliminate specifically earmarked funding for this program. Other Cooperative Extension Service funds will be used to conduct educational programs for small, private, non-industrial forest landowners where appropriate.

- (3) A decrease of \$772,000 for Federal Administration and Coordination (direct appropriation) (\$5,433,000 available in FY 1983).

- (a) An increase of \$339,000 for annualization of pay that was absorbed in fiscal year 1983 that is necessary to carry out the program in Fiscal Year 1984.

- (b) An increase of \$70,000 for the Commonwealth of the Northern Marianas.

Need for Change. This proposal is to provide extension education programs to the Commonwealth of the Northern Marianas. As specified under Section 601(c) of Public Law 96-597, the Secretary is authorized to extend at his discretion programs administered by USDA to several insular possessions including the Commonwealth of the Northern Marianas.

Nature of Change. This amount will initiate an extension program on a limited scale in the Commonwealth, in conjunction with a similar initiative on agricultural research by the Cooperative State Research Service. Initial program efforts will include a limited number of on-farm demonstrations on selected agricultural production and marketing problems and some home economics and youth programs with emphasis on family living and human nutrition.

- (c) A decrease of \$1,181,000 consisting of: \$500,000 for Rural Development Centers; \$280,000 for Technology Transfer; and \$401,000 for general administrative costs.

Need for Change. The Department is requesting adequate Federal Administration funding to support the planned ceiling of 177 staff years. Reductions proposed for earmarked projects funded under Federal Administration are consistent with the reductions in other extension earmarked programs. It is more important at this time to maintain support for the Smith-Lever 3 (b&c) formula.

Federal support to the regional Rural Development Centers is not being proposed for continuation. States belonging to the respective regions can at their discretion choose to assume support for these centers from Title V funds currently being made available to them under the Smith-Lever formula.

Technology Transfer pilot projects provided in FY 1983 are also not being recommended for continuation since similar programs can be carried out using formula and other funds available to the states. Moreover, it is deemed that the funds provided in FY 1983 will be sufficient in developing the necessary program needed for universal application.

Nature of Change. This Proposal will eliminate funding support for the Rural Development Centers and for special projects dealing with technology transfer. Support for overall program management and administration by ES-USDA is also being reduced.

STATUS OF PROGRAM

The Extension Service of the U. S. Department of Agriculture (USDA) through its partnership with land grant colleges and universities uses a nationwide educational delivery system to extend research based knowledge and transfer appropriate technologies into every County in the United States and its territories. This lifelong education process is off-campus and informal--and recognized internationally as the most successful education system of its type ever developed.

The national Extension system has helped build the world's most abundant food and fiber production system while being a leader in adult education on management and conservation of natural resources, and a catalyst for family, youth, community, and rural development. Extension is as timely and needed today as when it was created in 1914.

Extension is a model of decentralization. A Federal staff of 116 professionals supports a nationwide staff of 17,000 Extension professionals and 5,600 paraprofessionals. Extension Service-USDA demonstrates the value and strength of identifying and carrying out those essential functions that only the Federal government can perform, or carry out most efficiently, while at the same time keeping the size of the Federal agency to a bare minimum.

Extension is a bargain. Every dollar of Federal money is currently matched by an additional \$1.74 of State, County, and private funds--funds that would not be available without a Federal commitment and stimulus.

In addition, about 1.5 million Extension volunteers greatly multiply the impact of Extension's professional staff. They extend Extension's program scope and influence as they are dedicated and locally respected advocates for the Extension goal of helping people to help themselves. Extension's involvement of volunteers demonstrates effective leadership development and is a forceful example of a legitimate and appropriate role for government that clearly recognizes that the major source of our continued progress and success comes from the private sector.

As Extension is a research-based educational system, it is practical, efficient, and cost-effective. Increasingly, Extension is called upon to teach individuals skills needed to become self-sufficient as social service and regulatory programs are curtailed and eliminated.

The Extension system partnership includes the land grant universities established in every State as a result of the Morrill Act of 1862, and the historically black land grant institutions that were established in 16 States by the Second Morrill Act of 1890, as well as colleges and universities in the District of Columbia, Puerto Rico, Guam, the Virgin Islands, American Samoa, Micronesia, the Northern Marianas, and Tuskegee Institute in Alabama.

All of these institutions conduct vigorous Extension programs that collectively are the national Extension system.

Memoranda of Agreement between USDA and all the Nation's land grant institutions undergird the State-Federal partnership. As the Federal partner, the Extension Service-USDA provides program leadership, program coordination, and approval for funds accounting for approximately 40 percent of the total dollars spent on Extension education. The remaining 60 percent of funds is provided by State, County, local sources, and private enterprise. The responsibility of the State partners--the State Cooperative Extension Services--is to carry out Extension's multifaceted educational program in a wide variety of "grassroots" settings.

The Extension network utilizes varied delivery methods and flexible staffing patterns to develop and adapt program content that reaches out and responds to high-priority local needs and interests while incorporating relevant broader national USDA priorities and concerns.

The basic premise of Extension educational programs is that human progress is enhanced when research is translated into readily understandable language, then is made widely available to individuals, with assistance given to develop higher quality decisionmaking skills for analysis and application of the factual information. The key to Extension's success is its unique partnership structure--Federal, State, and local governments--and strong guidance and participation in setting its priorities from those it serves. Extension staff live and work among the people they serve, thereby fostering close local ties which stimulate and educate people to make long range plans and to cope with their problems.

Extension's program delivery methods range from highly individualized one-to-one consultation and tutoring, to the use of mass media for contacts with the general public. Selection of specific methods depends on the educational problem encountered. For example, in highly technical areas such as crop pest control, onsite inspection may be required for satisfactory problem analysis and recommendation. However, the one-to-one approach may also be the best way to motivate a farmer who is barely at the subsistence level to adopt better agricultural practices to make that particular farming operation viable or to insure improved family nutrition with low-income homemakers. And as excellent as mass media is for reaching large numbers of people with general information this method is much more effective in creating awareness and stimulating interest than in fostering adoption of new practices. Efforts are now being made to demonstrate the latest electronic communications techniques to rapidly transfer knowledge and skills to Extension's clientele.

Extension's role in technology transfer involves transferring technical information or "know how" based on research and development by State land grant universities, Federal research organizations, the private sector including industry and foundations, and from non-land grant universities. Transfer of such information has been basic to Extension programs designed to meet the needs of farmers, ranchers, foresters, homemakers, youth, and communities. Extension programs assess needs and convey information on advantages and disadvantages of applying alternative technologies relating to such diverse fields as agricultural production and marketing, financial management, food selection and preparation, home maintenance and repair, installation of

community services, and environmental protection. Most program delivery methods have broad application but need careful tailoring to be effective in specific situations. For instance: there are more than 550,000 volunteers who advise and lead 4-H groups and help with individual projects; over 100,000 junior leaders (older 4-H'ers) who assist them; over half a million volunteer leaders trained by Extension home economists to arrange and conduct educational programs for local homemakers and families; voluntary groups which spearhead efforts for community development projects; the many farmers and ranchers who permit their operations to be used for agricultural and management demonstrations, and then open them for educational tours; and, many "Master Volunteers (gardeners, food preservers)" and others representing groups--all needing different kinds and amounts of leadership development training and support from Extension professionals. They as volunteers multiply Extension's resources and capabilities many times.

Extension programs are crosscutting. The expertise represented by the various disciplines integral to Extension is widely used to support each other's program needs. For example, energy specialists suggest improvements in utilization efficiency for farms, homes, community buildings, and small businesses. Crosscutting can also be expressed in the linkages Extension initiates with other agencies and organizations to identify shared responsibilities and interests in certain program areas.

Extension encourages cooperative agreements with other USDA agencies such as the Forest Service, Food and Nutrition Service, Farmers Home Administration, and Soil Conservation Service. Other agencies of a wide-ranging diversity outside USDA include the Department of Energy, Bureau of Indian Affairs, Environmental Protection Agency, Fish and Wildlife Service, and National Sea Grant College Program. Such diversity illustrates the broad application and adoption of the Extension educational system to many different subjects, programs, and audiences. In a number instances, the cooperation involves provision for pass-through funding to Extension from the cooperating agency, thereby reducing duplication and getting the educational job of technology transfer and adoption done in a cost-effective and most successful way.

Extension's practical, down-to-earth approach to solving everyday problems frequently belies its sophistication. The challenge to be results-effective, process-effective, involvement-effective, and cost-effective is ever-present--internally driven as much as externally imposed. Of great current interest is the increased utilization of computer technology to assist program delivery. Extension already has considerable experience in helping farmers, ranchers, homeowners, and small businesses in using programmable calculators to advantage. Several agricultural weather and market information networks, such as AGNET and EXTTEL, are in routine use by Extension clients in many States. Other successful computer programs are designed to help users "walk-through" the decision-making process in farm crop and animal management and production, family financial management and budgeting, human and animal nutritional analysis, energy management, and community grant-funding sources.

The development of leadership abilities is a pervasive but often unrecognized benefit from participation in Extension programs. In Extension's close, collaborative working relationship with people at the "grassroots" level in designing educational programs suitable for the targeted audiences, participating people are encouraged, prompted, and assisted to articulate their needs and interests and are helped to emerge into fully competent, confident leaders.

The Extension Service-USDA/State Cooperative Extension Service partnership has clearly demonstrated the capacity to adjust its programs as the problems of agriculture and rural families and communities change, and to contribute to solving urban problems as well. In making decisions on program priorities, Extension relies on guidance from those who seek and need information. As a voluntary educational and technology transfer program Extension can only succeed when it is in consonance with such needs. Extension prides itself on being a piece of the government which never left the people. Since its start in 1914, Extension has been contributing vigorously to maintaining a "self-help society."

Educational programs address National, State, and local concerns consistent with Extension's mission and priorities. Ongoing broad Extension program thrusts include increasing productivity, conserving resources, improving marketing, developing management capabilities, enhancing health and quality of life, and assuring economic security and stability. These thrusts are described in the six sections of Part I that follow this introduction. The six program thrusts cut across and involve all of the traditional Extension program areas. For reference, the distribution of Extension professional staff effort nationally among these traditional areas in FY 81 was: Agriculture, 39.1 percent; 4-H and Youth, 26.7 percent; Home Economics, 22.0 percent; Community and Rural Development, 7.6 percent; and, Natural Resources, 4.1 percent.

Part II provides descriptions of those special, targeted Extension program efforts for which earmarked funds have been made available: integrated pest management, pesticide impact assessment, farm safety, urban gardening, Expanded Food and Nutrition Education Program (EFNEP), and Renewable Resources Extension Act (RREA) activities.

PART I

DESCRIPTION OF BASE PROGRAM
PRIMARILY FUNDED FROM THE SMITH-LEVER 3(b) and 3(c),
1890 and TUSKEGEE, AND DISTRICT OF COLUMBIA EXTENSION APPROPRIATIONS

SECTION 1--INCREASING PRODUCTIVITY

Current Activities:

One of the goals of the U.S. Department of Agriculture is to build a sound, strong, more profitable agriculture and forestry. One approach to this is through increasing productivity which assures an adequate and wholesome food and fiber supply that is attractive to consumers and competitive in foreign markets. Families can increase their own productivity by learning how to conserve energy and to grow and preserve much of their own food. Increasing productivity means involving youth and adults in educational programs that assist them in acquiring the knowledge, developing their life skills and in forming attitudes that enable them to become self-directing, productive and contributing members of society for the rest of their lives. Increasing productivity means working with rural community members, their local governments and small businesses, to help them develop leadership skills, and to help them improve their managerial abilities so they can be more productive. It means reducing soil erosion and soil salinity to protect the productive capability of our Nation's soil, and it means providing a sufficient return to producers to give them an incentive to return to the land each year to produce our food and fiber.

Selected Examples of Recent Progress:

Animal Production: In Iowa, one cattleman figures he will save nearly \$22,000 in this year alone due to an Extension program. Basically, he is feeding less protein to cattle headed for slaughter. The secret is to know how much protein to withhold and when to withhold it. Iowa Extension livestock specialists developed a program whereby cattlemen can calculate this data using a computer and programmable calculator. It has been shown that cattlemen can save \$10 or more per head without additional inputs such as feed additives, labor or equipment, and there is no sacrifice on gains, grades, or yields by only feeding less protein. It is estimated that if only 20 percent of the slaughter cattle sold from Iowa feedlots had the protein level adjusted according to Extension's recommendation, \$520,000 would be saved annually by Iowa cattle feeders.

4-H Animals and Poultry: Nationally, more than 1.4 million youth were enrolled in animal and poultry 4-H projects last year--an increase of about 100,000 over the previous year. In Kansas, innovations in traditional beef, sheep, swine, and horse projects are continuing to attract record numbers of 4-H'ers to these projects. Last year, nearly 14,500 market sheep, swine, and beef were identified with special Kansas 4-H ear tags. At an average price of 60 cents a pound, the 5,000 4-H'ers enrolled in beef

projects contributed more than \$4,321,359 to the Kansas economy. Through these projects, youth are gaining an understanding of animal science production technology, exploring potential careers, and learning a lesson in personal responsibility through care and feeding of their animals.

Facts for the Pork Industry: In the late 1970's, the Extension Service initiated a "Pork Industry handbook", that has become the Bible of the swine industry. It is now widely used as a text in many agricultural colleges and vocational agricultural schools. The "Handbook" contains nearly 100 fact sheets on many phases of hog production, and another dozen fact sheets are in production. About 400 top land grant university Extension and research scientists and swine producers were involved in the fact sheets' production. The American Soybean Association (ASA) is having the Handbook translated into Chinese because China is the largest hog producing nation in the world, and hogs eat more soybeans than any other farm animal. The U. S. is the largest soybean producing nation in the world, and the ASA figures that a Chinese version of Extension's Pork Industry Handbook will lead to a significant increase in U. S. soybean exports to China.

Energy Conservation in Poultry Production: Spiralling costs for propane gas and electricity are causing great concern and economic hardships to poultry producers. In Oregon, where the cost of propane has more than doubled in 3 years, poultry producers are using partial house brooding. This is a system that confines chicks to a smaller area of the brooding house for their first 3 weeks. Plastic sheets are hung from the ceiling to divide the house into smaller sections. Confining the chicks to a smaller area saves heat. As the chicks grow and require less heat, they are moved to other areas of the house. Traditional systems require heating the whole house. One poultry producer in Clackamas County, Oregon had two brooder houses. One was uninsulated and used the traditional heating method, the other was insulated and used partial house brooding. Calculated on a production of 40,000 birds, this grower saved \$3,485 in the insulated partial brooding house compared to the uninsulated traditional house. Another Oregon grower reported that his propane costs in 1980 in his broiler operation was slightly more than \$8,000. Last year with partial house brooding, he cut his propane costs to less than \$4,000--a savings of more than 50 percent. The Oregon Extension Service is encouraging growers to adopt this system. Six years ago there was only one known producer using partial house brooding. Today, more than 75 percent of the broiler producers in Oregon are using partial house brooding.

Increased Lumber Production: Last year, Oregon sawmills saved 3.75 million cubic feet of logs, resulting in 30 million additional board feet of lumber made possible by a quality control educational program conducted by the Extension Service. Mills that implement a quality control program can save a minimum of 2 percent. An Extension specialist further extended the benefits of this sawmill efficiency work to additional States by publishing

the first book in the U. S. on lumber quality control, based on Extension experience with mills in Oregon.

Home Maintenance and Energy Conservation: Home repair programs were reported by 12 States as reaching 61,249 participants, of which 2,536 leaders taught an additional 22,817 persons. Home maintenance costs were minimized--increasing income \$10,705,300 through knowledge and skills learned. Using local energy office funds, the District of Columbia held 356 workshops reaching 14,326 residents to improve their self-help skills to do plumbing repairs, interior structural repairs, and installation of energy conservation materials. Value to participants who used the skills resulted in an estimated increase in total family incomes of \$216,500 this year. Additional families were also reached through television, exhibits, and fairs.

Home Food Production and Preservation: All States have programs in home preservation of foods. Last year 23 States reported 209,038 participants in classes in food preservation. These programs also trained 573 leaders who trained 19,277 preservers and more than 200 "Master Preservers." A typical example: Arkansas trained 11,200 individuals who then canned more than 1,102,000 quarts and froze more than 540,950 quarts of fruits and vegetables with a value of more than \$2,612,000.

SECTION 2 -- CONSERVING RESOURCES

Current Activities

Extension programs demonstrate the financial and other long-term benefits of conservation. Conservation means protecting and using resources wisely, as well as developing and using alternative resources. Extension programs help users conserve and develop energy, soil and water, forest, wildlife, marine, and other resources. Both the user and the Nation benefit. Almost everyone uses energy and other resources, and everyone can help conserve them. Educational programs reach many resource users through Extension's County and mass media delivery systems. Extension also reaches special audiences such as resource managers, businesses, dependent poor, and communities, as well as families, farmers, and youth--each of which fills a special place in the total rural economy and society.

Homes use less of the Nation's scarce energy resources when they are winterized, insulated, heated with wood, and protected by windbreaks. Energy audits show how much energy is being lost, and from where. Individuals also use less energy when they select energy-saving appliances, dress warmly, turn down their thermostats, and realize how much they can save by doing so. The 15 million people reached by Extension in FY 81 each saved at least 15 energy dollars per month. Farmers and ranchers use less energy through adopting minimum or non-tillage farming, selecting alternative fuels, maintaining equipment, and using solar energy for crop drying and other uses.

Communities and individuals conserve and protect other resources such as soil and water, forests, wildlife, farmland, shoreline, minerals, and marine resources. Farmers adopt minimum or no-tillage farming not only to save energy but also to protect the long-term productivity of the soil, which also helps reduce water pollution. Forests protect the soil and regulate runoff as well as producing wood and other forest products and services. Wildlife adds to the quality of life and also provides hunting opportunities. Land which is preserved for farm use rather than being withdrawn assures continued agricultural crops. Shorelines often need protection to continue to serve as a valuable resource. Marine resources are often fragile, and have tremendous unrealized potential. Land can be mined, and mined land can be reclaimed in a way that gives consideration to future values.

Selected Examples of Recent Progress:

Solar Energy on the Farm: Extension on-farm demonstrations have shown farmers in Maryland, Florida, South Carolina, Tennessee, Virginia, Illinois, Missouri, Kansas, and Michigan how to use solar energy to dry corn, wheat, tobacco, fruits, soybeans, hay, and peanuts. Nine States are participating in a special project to develop techniques for using solar energy to heat livestock structures for swine, poultry, and dairy animals. Many farmers are picking up ideas to use on their own farms through Extension tours or from the several farm magazines which have devoted full-length feature articles to this project. States participating are Vermont, Virginia, Ohio, Illinois, Minnesota, Iowa, Missouri, Nebraska, and Kansas.

Alternative Home Fuel Sources: The prudent use of resources and using alternative resources are ways consumers deal with rising costs of fuels. Information to help families make wise, energy-efficient consumer decisions in the purchase of fuels, equipment, installation, and proper use is provided by Extension staff. Nine States reported reaching over 60,000 individuals of which 359 leaders shared the information with an additional 2,000 households. Idaho's "Wood as a Fuel" program in 37 of 42 counties reached 24,600 individuals and over 39,000 publications distributed resulting in a 74 percent increase in the use of wood as a fuel without an increase in accidents. Consumer dependency on fossil fuels has significantly been reduced.

Household Energy Conservation: Over \$7,700,000 was saved by Arkansans after they participated in energy conservation and management programs in housing, furnishings, and equipment. Attic insulation was installed in 2,387 houses and the amount was increased in 4,507 houses. Energy management practices were improved in 37,985 homes through increased use of portable appliances, more efficient treatment and management of windows, and adjusted thermostats on both heating and cooling equipment and hot water heaters. A survey of a similar program in Alabama showed results of the participant contacts made through point of purchase exhibits, mall displays, lunch and learn classes, publications, radio, TV, and group meetings: 48 percent weatherized some area of their home; 66 percent lowered the thermostats; 88 percent closed off unused rooms; 71 percent

operated appliances more efficiently; and, 95 percent improved their energy conservation habits with information from the Extension Service.

Conservation Tillage: Conservation tillage continues to receive considerable attention from Extension programs. The Oklahoma Cooperative Extension Service obtained a grant from the Oklahoma Wheat Commission and published a bulletin, "Lo Till Farming," which discusses methods of conservation tillage and the benefits of such practices. The Ohio Cooperative Extension Service has conducted a State survey and found that some form of conservation tillage (including no-till) was used on 36 percent of the corn, 30 percent of the soybeans, and 35 percent of the forage seeded in Ohio in 1981. After the first 3 years of a Tennessee Cooperative Extension no-till demonstration on over 90 farms in the western part of the State, no-till acreage increased from 50,000 acres in 1979 to more than 300,000 in 1981. Cooperative Extension in Oklahoma has established more than 20 demonstrations of conservation tillage and conducted a number of field days, attended by over 2,000 farmers. Cooperative Extension in North Carolina, South Carolina, Virginia, Kentucky, Georgia, and Florida cooperated to develop an exhibit at the Sunbelt Exposition in Moultrie, Georgia. This exhibit of conservation tillage machinery and techniques was seen by over 60,000 visitors. Cooperative Extension in Iowa conducted a 2-day conference on conservation tillage. The Extension Service-USDA is actively participating in the establishment of a "Conservation Tillage Information Center" in cooperation with the National Association of Conservation Districts.

4-H Youth Conservation Activities: A national survey of 4-H members currently enrolled in natural resources projects and former project participants showed that youth learned a greater appreciation for wildlife and the natural environment. They learned responsibility and leadership skills and have taught others the value of conservation. Several alumni reported that they had selected careers in forestry, horticulture, botany, farming, range and pasture management, wildlife, and forestry products.

4-H members across Michigan planted more than 4,200 hybrid poplar cuttings during 1981 in a new 4-H "Energy Tree" program co-sponsored by the Michigan 4-H Youth Program and the Michigan State University (MSU) forestry department. The purpose of the new program is to test whether hybrid poplars can be planted and harvested as a wood energy source in Michigan. If the cuttings grow as expected, the young people can take new cuttings from this year's crop next year or the year after. Thus, thousands of hybrid poplars can be planted in an effort to reduce the dependency on more costly energy sources. Hybrid poplars developed at MSU show promise as an alternative energy source because they mature faster than most hardwood trees, are less expensive to grow, and are adaptable to a variety of soil conditions. Initially, plans called for involving only 10 counties in the program, but the response was so great that it was

expanded to include 21 counties during 1981. An additional 10 counties were planned for the 1982 project.

Reducing Crop Damage: Extension programs have reduced damage to apple trees New York; and potato plants, melons, and beans Michigan. Extension programs have reduced the damage from deer and other wildlife--such as rodents, birds, and predatory animals--through educational programs, and sometimes through educational programs that lead to hunting and trapping. Two orchards in New York were used to demonstrate deer-proof fencing. A special hunting season was approved after the public became aware of the problem in other areas of over-population. Michigan potato growers in one county saved over \$50,000 in damages as a result of deer herds being managed. Rat, mice, starling, sparrow, gopher, prairie dog, coyote, and snake populations are being managed in Nebraska and other Great Plains States where a handbook on the prevention and control of wildlife damage is available in every county Extension office.

Conserving Forest Resources: Twenty three demonstration forests in Alabama are being used to demonstrate how non-industrial private forests can be managed to increase their productivity while at the same time providing soil and water conservation, improved wildlife habitat, and recreational opportunities. The demonstration forests themselves cover nearly 15,000 acres, but the ultimate objective is to have an available forest in each county to demonstrate to owners of Alabama's 16 million acres of non-industrial private forestlands how their own lands can be managed for multiple forest benefits.

Management of Western Rangelands: One county (Kingman) in Kansas has improved 50,000 acres of rangeland (1/3 of the total) through educational tours which taught 120 ranchers better management and forage plant identification. The benefits include improved management, brush control, performance testing, and improved grazing systems.

SECTION 3 -- IMPROVING MARKETING

Current Activities:

Improving opportunities and alternatives for marketing of agricultural and home products continues to be an area of need and interest. Extension educational programs encourage producers to assume more responsibility in identifying various market opportunities, and to analyze the economic considerations for different alternatives. Marketing large quantities of agricultural products becomes more sophisticated and technical, and requires a greater level of knowledge on the producers' part to bring about productive sales of their products.

In recent times, new markets have been found for fresh fruits and vegetables in community farmers' markets. They have been popular from

a consumer's point of view, in that fresh produce can be obtained at reasonable prices. In addition to the financial considerations of farmers' markets, Extension training has increased understanding between the producer and the consumer regarding the nature of producing quality products and also helped the producer understand consumers' points of view.

In addition to improving marketing of food and agriculture products, Extension programs assist businesses and individuals to improve their marketing skills. This is particularly important with products in which there are poorly developed markets, such as timber and crawfish. A potential seller often knows little about timber. Selling may be a once-in-a-lifetime transaction. Extension provides information on where to go for assistance; how to mark, measure, identify, scale, and sell timber; how to grade logs; how to safely and efficiently harvest, saw, dry, process, and sell wood products; how to produce and market Christmas trees; and, how to produce and market maple products. The aquaculture industry is new and growing rapidly. Growers receive much information from Extension about how to grow, protect, harvest, process, and market aquacultural products, such as crawfish and catfish. Similar Extension programs reach families who seek to earn income through home-based enterprises.

Community Resource Development programs have contributed to improved marketing through helping communities understand local market opportunities and the resulting economic stimulation occurring from community markets. Extension education that reaches the adult family members in the home and on the farm also reaches youth to assist them in gaining skills and understanding the marketing process.

Selected Examples of Recent Progress:

Marketing Alternatives: Senate Resolution 225, passed in 1980, requested the Secretary of Agriculture to expand educational programs to help producers of agricultural commodities better understand their marketing alternatives. The most innovative current marketing alternatives programs reported by Cooperative Extension Services in this survey included: Ohio held a 30-hour, 10-week workshop for farm producers on marketing alternatives; Indiana conducted a closed circuit TV seminar for 15 statewide outlets, with 6 three-hour sessions for 700 participants. Other States used interactive TV for remote county meetings; a 6-hour pricing workshop for producers and spouses; tele-auctions for livestock producers; fundamental and technical analysis of market performance; and, coordination of various sales agreements through farm organizations.

4-H'ers Use Alternative Markets: 4-H members are enrolled in marketing projects in increasing numbers and in broader types of programs. In 1981, 17,485 youth were enrolled in marketing programs. For example, a North Carolina girl produced 50,000 pounds of tomatoes to fulfill a contract with a distribution company. She traced her tomatoes and knew that some of them were involved in international trade. An Indiana boy tapped his family's maple sugar trees, producing and marketing maple sugar from those trees. His venture has been so profitable he plans to increase his operation to include 5 times as many trees. A New York girl planted 10,000 gladiola bulbs for commercial flower markets. She utilizes contracts to lock in profits for her enterprise.

Marketing Feeder Cattle: North Carolina has a program of "special" feeder cattle sales, designed for small farmers to pool their cattle. These cattle are "packaged" by sex, weight, breed, and grade in order for them to be attractive to the feeder/buyer. The program is carried out with the cooperation of North Carolina's Extension Service, Cattlemen's Association, and Department of Agriculture. The program has been successful because Extension agents are informing the producers about the requirements and advantages of this type of sale. Studies have shown there is approximately an \$8/cwt advantage for steer calves and a \$6/cwt advantage for heifer calves over those marketed through regular channels. A farmer marketing 30 calves per year will show a net income earned of \$945 above marketing through normal channels. This program covers feeder calves, yearling cattle, and spring stocker cattle. For the 52,000 head sold through the special sales, this represented a \$1.6 million increase in income to the beef producers marketing their feeders through the special sales.

Marketing Southern Timber: Landowners who sell timber are better informed because of price reporting in South Carolina and other southern States. Landowners benefit when better markets are created for their timber, such as through the symposium on utilization of low-grade southern hardwoods conducted through the cooperation of the Tennessee Extension Service. Eight thousand or so South Carolina landowners sell timber each year, but it is a different 8,000 than sold the previous year, since timber takes many years to grow. Most individual sellers market timber so infrequently that they are at a great disadvantage in dealing with buyers. Now that price and other marketing information is available in South Carolina through county Extension agents, 1,644 requests were received from owners of 650,000 acres. Eighty-one percent said the information was useful to them. The Tennessee symposium, which focused on the economic potential of enterprises to use low-grade hardwoods, was attended by 182 industry leaders, and a proceeding was widely distributed. Markets for sellers of low-grade hardwoods will improve as new enterprises similar to those discussed in the symposium develop a demand for this raw material.

Education for Home-Based Businesses: In 1977, 301,000 women owned businesses in the United States with receipts amounting to \$41.5 billion. Many endeavors fail due to a lack of knowledge and poor business practices. Twenty-five percent of the States have programs to assist people explore the possibilities and the process to begin or expand a home based business. Alabama, Massachusetts, New Mexico, and Ohio "Sewing For Profit" seminars reached 1,600 individuals. Eleven businesses were established, 50 percent of participants increased income as a result of knowledge gained at the workshops, and 65 percent reported improved business management practices resulting in higher profits. Pennsylvania Small Business Seminars, cosponsored with Small Business Administration and local resources including accountants, attorneys, and bank officials, reached 530 citizens. Topics included choosing and starting a home business, financing, records/taxes, legal aspects, and management skills. Two businesses were established--manufacturer of maple sugar extract, and a profitable home-baking operation, with outlets at several farmers' markets and roadside stands. Over 60 percent of participants decided against starting a new business or postponed beginning a business because of

information received at the seminars, ultimately saving precious dollars not invested and business failures.

SECTION 4 -- DEVELOPING MANAGEMENT CAPABILITIES

Current Activities:

Various studies indicate that communities interested in stimulating economic growth need a program which balances agriculture with business and industry and related services and institutions. Extension training to increase management proficiency increases the survival rate of new, small, expanding businesses, thus providing a retention of jobs and income.

Extension is applying a wide range of educational methods and techniques to develop management capabilities. Approaches include computerized budgeting, outreach counseling, mechanical harvesting, and home-study courses, to name a few. These are being applied to a broad range of management problems--financial management, capital accumulation, livestock management, nutrition, home budgeting, family farm survival, consumer economics and clothing care, for example. Major clientele groups include homemakers, small businesses, livestock managers, lumbermen, watermen, food service workers, day care center personnel, farm wives, the tourism industry, and youth (again only a sample).

The objectives of such Extension education programs are improved management capabilities so people can deal intelligently with such overriding issues as narrow profit margins, escalating energy costs, unemployment, declining investment opportunities, a shrinking tax base, community growth patterns, and overall questions of resource allocation and use.

Selected Examples of Recent Progress:

Healthier Small Businesses: Financial management educational programs offered by Missouri Extension have improved the financial condition of 27 businesses. An advisory committee of 10 small businessmen, bankers, and CPA's identified educational needs. The Small Business Administration (SBA), a bank, and the University of Missouri's Engineering Management Center assisted Extension staff with program content. Eighty-two individuals from 59 Springfield area businesses attended a workshop. Impacts were measured by results of followup counseling which led to 8 long-term loan applications, major changes in accounting systems for 12 firms, and transference of accounting transactions by 7 businesses to CPA firms.

Small Business Outreach: The SBA office in Little Rock, Arkansas arranged \$1 million in loans per month before the "Small Business Outreach" was started. This increased to \$3 million in the first quarter after the program started, and to \$6 million in the following quarter. Extension county agents and community development specialists worked with businesses, State and Federal

agencies, public officials, Chambers of Commerce, and farmers to coordinate and present referral services. The Joint Extension-SBA effort resulted in 34 meetings with 2,269 participants. Agents contacted 2,050 farmers and small business people and completed 1,085 small business surveys.

Management Skills for Food Service Workers: Virginia's Department of Corrections requested the Virginia Cooperative Extension Service to provide in-service training for 185 food service managers and supervisors. Eight 3-day workshops were held on food preparation, supervision, sanitation, motivation, and energy management. Reported results include: an increased level of professionalism; increased job effectiveness in supervising and training staff and inmate workers; and, improved operational performance resulting in lower costs valued at \$28,000.

Improved Family Financial Management: All State Extension Services assist household members to improve their financial management and budgeting skills to allocate and extend available resources after participating in workshops, home-study courses, computer-assisted learning, and through publications and/or mass media programs. Eighteen States reported reaching over 184,000 workshop participants, including the training of 2,500 leaders who extended the information to an additional 42,000. Almost half of the participants reported learning new knowledge to assist them in financial planning and increasing incomes by at least \$290,800. In Mississippi, 26,610 residents attended workshops and 259,996 copies of educational materials were distributed. Reported results include: 98 percent of families or individuals adjusted spending to maintain a level of living compatible with resources, goals, and values. Over 90 percent learned to increase spending power, 49 percent established a safe level of credit, and 52 percent made long-range plans.

4-H Clothing Projects: Massachusetts Extension reports 1,380 4-H'ers enrolled in clothing projects, each making an average of 7-1/2 garments per project year at a savings of \$104.80 over ready-to-wear costs. This totals to 10,350 garments and savings of \$144,624. 4-H members reported learning new construction techniques, how to care for their clothes, economic benefits, and gaining control over quality.

SECTION 5--ENHANCING HEALTH AND QUALITY OF LIFE

Current Activities

The ultimate measure of quality of living is the kind of human being produced. The nature of the person determines the character of society and of future generations. Quality of living encompasses the sum total of all experiences of the individual. It has material aspects, since all people have primary need for food, clothing, housing, and a measure of security. It also includes social and psychological aspects as well.

Objectives of quality-of-living programs call for Extension to: enhance the quality of individual and family decisions and provide the skills to carry them out; increase the ability of the individual to interact effectively with others; help people to learn to use community services and take part in developing them; and, improve the social, economic, and geographic mobility of the individual. One of Cooperative Extension's greatest strengths has been its recognition of the home and family as an economic unit that profoundly affects all the other socio-economic aspects of our society. From birth, the individual's home environment sets the person's life pattern. The experiences with family, friends, schools, the contacts with the economic and political system--all these determine the person's views of society and that individual's place in it.

Good health is one of the most precious resources a person can have. The state of an individual's health affects his or her whole being, which in turn affects those around that person, who then influence others. This cascading effect indicates how a single person affects society. Therefore, the major priority for family health is to recognize and utilize preventive health care measures throughout the life cycle to enable each individual to attain maximum potential and thus benefit society and community. Food and Nutrition are the largest factors affecting the health of every individual from the time of conception to death. More than half of Extension Home Economics professional time is expended in this area--1,481 professional FTE's and 3,185 paraprofessional FTE's.

Extension staffs in every County and State are recognized as authoritative sources of human nutrition information, food safety, and home food preservation technology. In many areas of the country, the local Extension office is the only source of research-based information related to food and human nutrition technology. This information assists people to make informed decisions on how to maintain good health and how to do so in a cost-effective manner in order to combat the pressures of economic stress.

The National Extension Homemakers Council represents over 500,000 members in the United States, Puerto Rico, and the Virgin Islands. This organization of volunteer leaders trained by Extension home economists supports and extends the benefits of Cooperative Extension Service educational programs to 75 million contacts annually. Extension Homemakers contribute over 30 million hours of volunteer service to families and communities across the Nation annually. Their volunteer service has a value of over \$135 million. The Extension Homemakers organization's educational programs provide its members opportunities to apply new skills, gain knowledge, and improve practices within the home, family, and community. One-third of the members have gained knowledge and skills which increased family income either through home-based business or from outside employment.

Selected Examples of Recent Progress:

Cooperation With Other Agencies: A cooperative agreement was enacted in 1982 between USDA and the American National Red Cross (ANRC) to develop and implement a 12-session-hour course on nutrition. The Extension Service and HNIS agencies of USDA

develop the educational content to support the course which ANRC will implement via its instructors in 3,000 local chapters. This represents one of the many successful collaborations between the Federal Government and the private sector to cost-effectively utilize the expertise and resources of each organization to the benefit of the public.

Improving Family Self-Sufficiency: Home gardening and food preservation are continuing to be a means to improve family nutrition and to save money. Food spoilage of home canned and frozen foods continues to be a widespread and costly problem. To disseminate proper food preservation techniques Mississippi Extension home economists conducted 285 workshops with 9,429 persons attending. In addition, State and County Extension staff in four cities reached 6,844 people with food preservation information through yard and garden clinics. Transfer of food preservation technology was provided in all States by a variety of methods such as TV, radio, newspapers, computer assisted information, home study courses, telephone answering systems, newsletters, and workshops or lectures. Many States such as Michigan, New Mexico, Maine, Washington, Idaho, and Oregon, have initiated Master Food Preserver courses to train volunteers to help disseminate home food preservation technology and information. One State, Oregon, trained 39 Master Preservers, who donated 1,800 hours from mid-June through September in answering phones, conducting workshops, and preparing and staffing exhibits at fairs and shopping centers. North Carolina, Minnesota, Oregon, and Kansas, which had over 100,000 calls, are among States offering special dial access telephone systems for answering clients' questions. Small surveys in Mississippi, Maryland, Montana, Connecticut, Arkansas, Alabama, Texas, and South Carolina showed that just the families surveyed had saved \$1,250,864 on their food costs last year. Home gardeners are able to realize a 26-fold profit over their costs in one year.

Obesity Control: Obesity is the most widespread nutritional problem in the United States. Proper weight control and maintenance are a blend of reliable knowledge, adoption of good food habits, and incorporation of healthful daily activity patterns into a chosen lifestyle. Seventy-three Kansas Extension home economists trained in the relationship of nutrition to health in turn trained 1,290 volunteer leaders, who trained a minimum of 100,000 people on the subject. More than 1,600 people participated in an 11-week Georgia Extension series on weight control. The average weight loss was 10.5 pounds for women and men. A byproduct of this program was lifestyle change that saved an average of \$5.00 per week, or \$100,600 for the participants.

Maternal and Infant Nutrition: Nutrition is a vital health issue affecting women and children of all socio-economic levels. It is generally accepted by health professionals that a woman who is well nourished prior to conception and during pregnancy will have a better chance of having an uncomplicated pregnancy and a healthy infant. In a recent national survey, Extension Service-USDA found that 80 percent of the States provided nutrition education programs to women with children. Seventy percent of these States presented breast feeding information as part of the program.

West Virginia enrolled 4,131 pregnant women in a program called "Blue Ribbon Babies Through Better Nutrition." Seventy-five percent of these mothers had not had previous contact with Extension. They reported 60 percent drank more milk, while 53 percent cut down on carbonated beverages and 49 percent cut down on candy and other sweets. New York has a nutrition program aimed at children in the Head Start and Children's Corner programs. They were able to get both programs to serve better snacks (vegetables and fruits) and more nutritious lunches. They also met with parents to encourage them to use more nutritious snacks at home and to try new ways of fixing vegetables so kids will eat them. New Jersey and Maryland have developed specific programs aimed at the Hispanic population to provide sound nutrition information relating to diet and health and yet consistent with their cultural background and diet.

Health and Safety Programs: National enrollment in 4-H health and personal development projects amounted to more than 670,000 young people. Of this number, 340,000 participated in health projects involving dangers of smoking, physical fitness, stress, dental hygiene, drug abuse, and first aid techniques. For example, some 2,500 4-H members in 20 counties in Florida were involved in health projects last year. This increase was due mainly to the pilot program, "4-H for Life," which helps teenagers become more aware of their health, types of activities that affect their health, and what they can do to improve their health. Over 190 requests have come from other States regarding this highly successful pilot program. This innovative approach of using computerized health profiles for teens 12 to 18 years of age has served to create an interest in health for many youth. In one county, 111 teens have taken the health risk profile and are now involved in a special health program on alcohol and tobacco. In Arkansas, 4,006 adults from 1,814 families participated in health prevention and promotion activities such as health fairs, health screening, vital medical information programs (Vial of Life), dental health, exercise, wellness, nutrition, diet and weight control, stress management, smoking, alcohol, drug use and abuse, first aid and cardiopulmonary resuscitation. Through these health prevention and promotion practices, an average of \$35 per family was saved on medical bills, and their physical and mental well-being was improved. Over 1,500 persons were involved in classes on fire protection, poison prevention, and safety in the home. Eighty percent of the participants changed at least one safety practice in their homes.

Family Stress Management: Programs to help families cope with the increase of stress being caused by the economic uncertainty and social changes have been a major focus of Extension Services Home Economics programming. In Kansas, 22,000 people received training in stress management, and another 38,500 publications on effective ways for dealing with stress were distributed throughout the State. Reports from 15 other States indicate that over 126,000 people participated in Extension programs designed to help them more effectively cope with stress.

Community and Rural Development: Extension applies the latest scientific and technical knowledge to specific community problems, emphasizing organizational and leadership development, often working with and through units of local government to achieve the desired results. Each year Extension, through its Community and Rural Development programs, helps people with more than 50,000 different community improvement projects. In a Health Systems Agency (HSA) area of Alabama, covering 12 counties, county health councils have been involved to varying degrees in establishing 12 health clinics which treated 15,000 people in one year and totaled about 45,000 different visits. Extension provides organizational and leadership assistance to the area and county systems. Thirty-three counties have councils which have been involved in 66 projects and programs, including visual and hypertension screening, cancer awareness, home health care workshops, fluoridation, and dog and mosquito control. An Extension agent in Maryland set up and chaired an advisory committee to study water quality of the Patuxent River. Working with people in other agencies who had control over pollutants, the committee was able to improve the average pollution rating 49 percent at 19 river sites. Oyster bars and fishing areas have been reopened after being closed for 6 years.

SECTION 6--ASSURING ECONOMIC SECURITY AND STABILITY

Current Activities:

Economic stress, energy costs, and increasing unemployment have focused the Nation's attention on financial management and prudent use of resources. In every State and County the Cooperative Extension Service has educational programs designed to assist people and their communities--farm, rural, and urban--to improve abilities and adopt practices which promote economic stability in adverse conditions with some measure of security for the future. The programs encourage: economic, business, and industrial development; knowledge and use of financial planning and decisionmaking skills throughout the life cycle; and, management and use of available resources (human, material, natural and environmental) by public and private sectors.

A variety of Extension educational programs have been directed to improving economic well-being by using available resources, acquiring greater self-sufficiency for individuals and, for some, acquiring job skills. Some programs dealt with concepts and principles of economics--spending, borrowing, saving, protecting (insurance, estate planning, etc.), investing and sharing (taxes, social security, etc.). Other programs focused on the efficiency, attractiveness, durability, comfort, and safety of homes.

People and their governments in communities, large and small, across the Nation are struggling to provide necessary services for families and individuals. Extension programs utilizing volunteers play a vital role in many States in efforts to provide deregulated community services that stretch available resources.

Selected Examples of Recent Progress:

Extension Assistance Through Other Agencies: Today's high interest rates, which farmers must add to their ever higher production costs, increases their financial management problems. Farmers have almost doubled their debt load over the past five years. Now, the lower income/higher costs situation puts them in a state of jeopardy if they use more high-interest credit to fill today's cash-flow gaps--and those of tomorrow.

Work underway with other agencies includes disseminating information on new crop insurance, new farm legislation, and the 1982 farm program. Also, assistance to national offices of lending organizations is being done to conduct cooperative educational efforts. Both information and training is provided to farm lenders' staff to assist them in working out satisfactory credit arrangements with their farm borrowers. Extension has trained Farmers Home Administration (FmHA) field staff on using Extension-developed financial management computer techniques--both to evaluate farm loan applications, and to follow-up the progress of borrowers. New Jersey oystermen continue in businesses by convincing FmHA that the outbreak of MSX disease which destroyed seed stock was a "natural disaster," which enabled oystermen to replace lost seed stock with the low interest disaster relief loan obtained through FmHA.

Innovation in Family Resource Management: A special project in Indiana to develop a curriculum sourcebook in Family Resource Management has been funded by USDA-Extension. This program development guide is designed for Extension Agents to assist families in planning and managing their finances. The curriculum sourcebook directly supports one of the new Initiatives in Home Economics, identified by Congress in the National Agricultural Research, Extension, and Teaching Policy Act of 1977 and 1981 which calls for expanded and improved programs in home economics. The project has an advisory group representing expertise from ARS, CSRS, CES, and ES-USDA. Completion date is projected for early 1983 with anticipated distribution to all States and Counties.

A second Extension innovation is the initiation of a "new model" of program support for the Cooperative Extension system. Family Resource Management specialists, one in each of 4 regions, will spend about one third of their time identifying and sharing expertise specifically within their region and ultimately to all regions across the Nation. A fifth specialist will spend half-time identifying and sharing current or completed research and other information or data base sources pertinent to Extension needs. In addition, a system for electronic transfer for sharing resources will be developed.

Extension Assistance to Elected and Lay Leaders: Arkansas projects range from rural fire protection to doctor recruitment and clinic development to solid waste management. Upgraded rural community fire departments resulted in reduced premiums for families in the protection districts by \$300 a year. The South

Carolina 1890 Extension program worked with feed and seed dealers and the Department of Health and Environmental Control (DHEC) to help low-income families control rodents and save money at the same time. Sixty-eight of the low-income families received rat poison from DHEC at cost.

"Sewing by Satellite:" A conference sponsored by Extension Service-USDA, American Home Sewing Association, and the American Home Economics Association was attended by 6,000 professionals, (almost twice the number expected) at 25 cities including Canada. Education and industry representatives experienced a first in technology transfer of receiving the latest information and technology from national experts and the opportunity to share expertise via satellite.

Business Management Education: An educational program in Oregon dealt with both the historical and the present situation, and lead to a greater understanding of the business environment during periods of fluctuation. It also covered key indicators of business activity which are commonly used to speculate about the future for business in a recession. One hundred businessmen participated. Also, Texas Extension Service demonstrated that Christmas tree plantation culture can be a source of supplemental income to retirees on fixed incomes. Trees marketed from even a small (about an acre) plantation can provide livelihood in retirement, and a nice supplement to income. Alabamians enjoy fishing. Extension has made it even easier by helping bring the fish to the fishermen (and women), and at the same time, provided a good investment opportunity for catfish farmers. Fee-fishing on small, densely stocked ponds in urban areas saves travel costs, travel times, and energy. Two such 0.7 acre ponds sold 4,000 pounds of catfish per week during the summer, and provided nearby fishing to urban residents. Extension provides technical information on aquaculture to 550 Alabama catfish farmers who operate over 10,000 acres of ponds, of which 2,500 acres are available for fee-fishing.

Assessing Financial Implications of Public Policy: Credit and savings regulations, property transfer laws, escalating taxes, and high interest rates necessitate changing management of property and investments. Bank failures and proposed tax legislation indicate additional changes will occur. Continual up-date is needed to make wise use of family resources. Over 300,000 individuals from 10 States attended Extension programs on credit and savings regulations, tax laws, investment, and consumer education to assist them in making better financial management decisions. Some 944 Extension leaders shared the information with an additional 5,289 individuals. Sixty percent of the participants reported learning skills. Examples of State programs include: more than 25,000 West Virginia families, through group meetings and newsletters, received education on combating fraud and deception, obtaining redress, comparison shopping, inflation, and legal protection. Consequently, the State Extension Homemakers Clubs, of more than 15,000 members, have initiated a program to combat deceptive practices in the marketplace. "Women's Day at the Legislature," educated West Virginian women on

programs, current legislation, and ways to influence the legislative process. The event attracts more than 1,000 women annually from across the State.

Home Repair and Management: Homeowners and some renters are seeking skills to upgrade and maintain their homes for comfort and economy through Extension education. Thirty-seven States reported programs on improving home environments reaching over 600,000 individuals, of which 10,490 leaders extended the information to 34,549 households. Household incomes were increased over \$15.9 million through household production of self-help skills learned in home furnishings, home repairs, and energy conservation measures. A selected State example: In 23 Maryland counties, 4,594 homemakers, family members and low-income housing residents gained knowledge on insulation, home repairs, energy efficient window treatments, use and care of wood stoves, and efficient use of appliances. Follow-up evaluations report: 80 percent altered habits which saved energy or adopted one or more energy saving practices such as lowering thermostat, closing unused rooms, installing energy efficient window treatments, making home repairs such as caulking, weatherstripping or adding insulation; 30 percent reduced fuel consumption; 60 percent reduced electric bills by 25 percent to 50 percent and 40 percent reported increased comfort levels in their homes. Mass media--T.V., radio and newspapers--and newsletters reached over 3.8 million contacts. A similar program in Illinois reached 13,000 residents of which 75 percent reported using skills learned to extend family income an average of \$113 per family or a total of \$1,463,802 by doing their own repairs.

Development and Use of Computer Techniques. Many computer programs are designed to help farmers: make cash-flow projections; organize plans for their farms; analyze how profitable new farm investments will be; prepare financial statements and keep farm records; and, to provide estimates on total farm enterprise production costs. One State now has 50 micro-computer programs operational for farm use. Other computer programs assist families in financial planning and budgeting, energy audits for conservation of resources, and nutrition.

Home Computers have High Potential in Family Resource Management: A series of 7 "Micro-Computer Clinic Teleconferences" is being held by Extension Service-USDA with 12 States, from September 1982 to March 1983. This project follows the release and favorable feedback from the publication "Meet the Home Computer." Kits, handout materials for each session, and tapes have been offered to all States. In one-third of Texas' counties, 8,644 individuals participated in financial planning assistance programs, and 1,481 of these participants received personal financial counseling through computer assisted instruction. The result: 6,483 individuals and families improved their management skills, and 5,186 changed their financial planning behaviors; i.e., making or revising estate plans, setting financial goals, adjusting spending patterns, and adjusting use of credit. Seventy-five percent reduced installment debt, and sixty percent increased savings. In North Dakota 1,235 homemaker club leaders in 51 counties reached

23,000 club members. The result: 6,598 members changed their financial planning and recordkeeping behaviors. The top 5 changes were: 848 members organized household recordkeeping systems; 633 reviewed and devised ways to alter their living expenses; 552 examined the potential worth of their possessions; 467 opened a checking or savings account in their own name; and, 458 examined property ownership systems to determine the best system for themselves.

PART II

DESCRIPTION OF SPECIFICALLY FUNDED
EXTENSION PROGRAMS CONDUCTED PRIMARILY
THROUGH SMITH-LEVER 3(d) APPROPRIATIONS

SECTION A--INTEGRATED PEST MANAGEMENT

Current Activities:

Integrated Pest Management (IPM) is a system which combines the use of educational and service programs to help agricultural producers maintain profitability in spite of potential losses due to insects, weeds, plant diseases, nematodes, or other pests. IPM provides the kind of in-depth information and current status reports that agricultural decisionmakers need in crop production and post-harvest management situations. Extension Service is providing the educational portions of the program to growers and to the private sector providers of IPM services. These providers include agricultural consultants, cooperatives, or grower associations. The services include field scouting, consultation on pesticide choices, provision of non-pesticidal control factors, and production data management.

Selected Examples of Recent Progress:

Evaluation of peanut IPM programs revealed substantial increase in returns to growers. In the West Cross Timbers area of Texas, per acre net returns increased by \$15.90-\$64.00 on irrigated peanuts and by \$24.42-\$38.00 on dryland peanuts. Oklahoma peanut growers saved an estimated \$50-\$100 per acre in reduced pesticide costs and increased production. In Alabama at least 80 percent of the peanut growers follow treatment guidelines and enjoy an \$80-\$100 per acre economic advantage.

In Ashley County, Arkansas, 18 soybean producers participating in a pilot IPM project saved \$50,000 by avoiding unnecessary fungicide sprays, and avoided \$562,000 loss to insects by applying insecticide treatment at the appropriate time.

Participation in the alfalfa IPM project in Pennsylvania more than doubled. The net results of alfalfa IPM on 700 farms was an increase of crop value of \$440,000 plus treatment cost savings of \$57,000.

Programs which implement IPM in new crop systems have been developed. These include hops in Washington, papaya and guava in Hawaii, rapeseed in Alaska, filberts in Oregon, and other crops which have potential for increased return to growers who can use IPM.

SECTION B--PESTICIDE IMPACT ASSESSMENT

Current Activities:

The Pesticide Impact Assessment program provides the most objective and accurate data available for defining and evaluating benefits and risks of selected pesticides having critical agricultural and forestry uses. Inherent in this objective is the provision for a single, uniform approach to obtain data from the agricultural system. The selected pesticides are reviewed for response to reregistration by the U.S. Environmental Protection Agency (EPA) to assess their value to agricultural production adequate to meet domestic and foreign needs in comparison to possible hazards to human health or the environment.

Selected Examples of Recent Progress:

The Extension Service, other U.S. Department of Agriculture agencies, and the cooperating State Extension Services have established 29 assessment teams to address more than 50 pesticide active ingredients under review in EPA's Rebuttable Presumption Against Registration (RPAR) process. The potential adverse economic impact of cancellation of the first 21 pesticides or groups of pesticides under consideration is estimated at over \$6 billion annually.

State Cooperative Extension Service specialists, having the background, experience, and understanding of local, State, and regional pesticide programs and pest control practices, in each State assemble benefit-use information for retaining those pesticides necessary for adequate food and fiber production. Their intervention helps ensure that farmer and pesticide-user practical needs and complex problems are brought forth and dealt with in reregistering pesticides in a highly complex and often controversial decisionmaking process. In turn, these same specialists design their educational programs to help farmers and others use pesticides judiciously and deal with agriculture and the law.

Pesticide Impact Assessment Program (PIAP) reports resulting from Federal/State inputs have substantially changed the EPA's regulatory position as originally proposed for the fungicides benomyl and thiophanate-methyl. As a result of the PIAP report, the EPA determined that the risks associated with use of these fungicides are exceeded by the benefits of their use with only minor modification to the use procedures for benomyl alone. Consistent with the USDA's PIAP recommendations, EPA decided it will neither require label statements on benomyl products concerning potential spermatogenic effects and birth defects, nor will they require water-soluble packaging for benomyl products. Other comments and recommendations are discussed in the EPA's regulatory position document.

SECTION C--FARM SAFETY

Current Activities:

Farm and ranch residents have almost 58 percent higher accidental death rates than does the nation as a whole, according to national safety studies. In 1981, agricultural work accidents resulted in approximately 1,988 deaths and 198,000 disabling injuries. The costs amount to several billions of dollars. Some encouraging progress is being made. Agriculture's accidental death rate per 1,000 workers fell nearly 5 percent since 1980 and 11 percent since 1971. Despite this progress, agriculture still remains among the high rate industries.

Selected Examples of Recent Progress:

Minnesota continued to develop training materials and conducted 1-day training sessions for approximately 225 county Extension agents and vocational agriculture teachers. These instructors conducted training programs for over 4,000 people during the first 6 months of the program. Each program includes slide/tape/script sets and handout materials. Programs cover farm machinery, confined livestock housing, and logging safety topics.

Pennsylvania developed a new technique for extinguishing silo fires using a water injection probe easily constructed on the farm. A Cooperative Extension publication was printed and distributed in Northeast States to inform farmers and volunteer firemen on a step by step process for extinguishment. Previous fire fighting techniques of spraying water on top of silage resulted in heavy losses of feed and structures. This new technique can save farmers millions of dollars.

Farm related organizations in California have something tangible to show for their safety efforts. Policy holders with worker's compensation insurance through the California Farm Bureau Federation received over \$18 million of rebates by keeping accidents down in 1982. The Far West Equipment Dealers Association and Agricultural Aircraft Association policy holders each received over 1/2 million dollars in rebates. The California Extension Service has an active program with employers and employees in agricultural safety education, including encouraging 5 minute "tail gate" safety discussions and several types of instruction.

SECTION D--URBAN GARDENING PROGRAM

Current Activities:

The 16-city urban garden program continues to grow. The program, funded at \$3 million annually, is targeted at low-income residents, and generates an additional half a million dollars through cash and in-kind contributions from private and public organizations. The cities participating in the program are Atlanta, Baltimore, Boston, Chicago, Cleveland, Detroit, Houston, Jacksonville, Memphis, Milwaukee, Newark (NJ), New Orleans, New York, Los Angeles, Philadelphia, and St. Louis. Urban gardening in these cities teaches gardening skills as well as home use of produce and food preservation to more than 174,000 people,

including some 42,000 youth. One of the keys to the success of this program is the recruitment and use of more than 26,000 volunteers selected from the local areas within the cities. It is estimated that in 1980 the gardeners produced food valued at \$14.5 million. Not only is the income of these people being augmented, but their diets and nutrition have improved. There is also improved communications between neighbors and they have a sense of participation. The gardeners tend to look after each other's gardens and consequently, vandalism in the gardening areas is very low and community pride has increased significantly.

Selected Examples of Recent Progress:

Detroit's youth oriented urban gardening program was one of the original programs in 1977 and some interesting changes have taken place in 5 years. One has been a dramatic swing toward more home gardens. In 1980, there were 1,257 planted on slightly more than 75,400 square feet of gardening area. In the 1981 program there were 5,844 home gardens that averaged about 10 feet by 20 feet, for 1,168,800 square feet of soil used to grow garden vegetables. There were 6 larger demonstration gardens in the Detroit area and 51 community gardening sites with some 1,465 garden plots in them.

Los Angeles' urban gardening program uses all available resources in a multi-directional effort to insure that city residents with limited income could find "Common Ground" to grow gardens. In 1981, 7,024 people participated in the garden growing aspects of the program--nearly 2,500 of them were youth. There were 22 community gardening sites, with 1,428 plots on the sites, and some 1,140 home gardens. Of the 2,700 participants reported to have preserved foods from their gardens, 1,100 used either canning or freezing techniques--and 1,600 used drying. The urban gardening program in Los Angeles has established 4 free food drying centers, using electric dehydrators and facilities loaned or given to the program at no cost. The food drying centers also serve as training centers for the area's "Master Food Preserver" program--similar to the volunteer "Master Gardener" program.

The Philadelphia urban gardening program has more than 700 volunteers with 75 percent of them having had previous gardening experience. For teaching and demonstration purposes, the program is extended by having 22 Master Gardeners assisting the educational efforts of the 10 Extension Service staff members. In 1981, the Philadelphia gardeners raised an estimated \$2,004,120 worth of produce. Of the 18,309 people involved in urban gardening in the Philadelphia program, almost all of them were also involved in preserving some of their garden produce by using all 3 of the methods -- drying, canning, and freezing. A survey indicated that 89 percent of the gardeners also gave away some or all of their surplus crops to family, friends, and neighbors.

SECTION E--FOOD AND NUTRITION EDUCATION PROGRAM (EFNEP)

The Expanded Food and Nutrition Education Program (EFNEP), implemented in 1968 by the USDA and the State Cooperative Extension Services, has provided nutrition education to more than 2 million low-income families, representing 8.3 million family members. The target audience is homemakers who have young children. Currently 5,500 program aides assisted by 55,000 volunteers, trained by Extension home economists, are employed to reach families in about 1,000 program locations. In FY 81 more than 256,000 low-income families were enrolled in the in-depth nutrition education program.

A Congressionally mandated study of EFNEP (both adult and youth components) which made an assessment of the objectives, implementation, and effectiveness of the programs was completed in 1982. Results have been sent to Congress and overall they were favorable. A national committee is currently reviewing and studying the reports with the objective of implementing as many of the recommendations as possible.

Current Activities--Adult Program:

Families are taught to improve their diets through increased knowledge and improved nutritional practices. Throughout its history, EFNEP has had a positive impact on the diets of its program families. For example, dietary recall data from 9,812 adults at program entry indicated that 14 percent did not consume fruits and vegetables. After one year in the program, participants reported only 4.8 percent using no fruits and vegetables. EFNEP also increases the homemakers' ability to select and buy food, prepare and serve balanced meals, improve practices in food storage, safety, and sanitation and to manage food-related resources such as gardens and food stamps.

Sixteen EFNEP/Food Stamp pilot projects were funded in FY 80 by a \$2 million transfer from the Food and Nutrition Service of USDA. The projects were designed to explore the relationship of increasing the number of participants that can be reached (with a fixed level of resources) while still obtaining the favorable behavior change resulting from the one-to-one teaching method. These projects were experimental variations of the traditional EFNEP approach and tested ways to increase Food Stamp recipients' participation in EFNEP and increase the cost-effectiveness of educational interventions. An analysis of the EFNEP pilot projects revealed that the one-to-one teaching method was the most effective in bringing about behavior change and the projects were successful in increasing Food Stamp enrollment and participation in EFNEP.

Selected Examples of Recent Progress:

Ohio has documented changes taking place in EFNEP families in the areas of food selection, purchasing, preparation, handling, and preservation. For example in one year the EFNEP families increased their use of one or more servings from each of the four food groups from 72 to 90 percent and those that received a minimum of two servings of milk, one serving of meat, four

servings of vegetable/fruit and four servings of bread/cereal rose from 8 to 46 percent. During 1981, Louisiana served 8,159 low-income families in the EFNEP program. Seventy percent of them learned and practiced eating a diet consisting of at least one serving from each of the four food groups per day. In addition, families have a better awareness of the balance of foods necessary for good health, food buying skills, food preparation skills, food preservation skills, and in some cases how to grow a garden. Food recalls were obtained from 6,737 homemakers enrolled in EFNEP in Pennsylvania. At time of entry into the program, 51 percent had at least one serving from each of the four food groups per day. After graduating from the program 83 percent of the homemakers were routinely eating at least one serving per day from each of the four basic food groups.

In Michigan half the EFNEP families were from the rural areas, 44 percent were minorities, and 73 percent were receiving food stamps. Sixty six percent were on welfare. Nearly half the families had annual incomes less than \$5,000. The average family size was 4 and the average monthly food budget per family was \$144. "Spin Offs" from EFNEP programs in 16 Michigan counties include: 1) 346 finished high school, passed GED, or trained for employment; 2) 45 were hired by EFNEP program; 3) 112 children were returned to, or were not removed from 45 homes because aides worked with the homemaker to improve the home conditions; 4) 26 of the EFNEP aides were no longer on public assistance; and 5) 112 families were no longer receiving their major support from welfare because the aides encouraged and/or taught them how to improve their home situation by becoming better managers of their family resources. This saved the state of Michigan \$72,494 per month. Mississippi had EFNEP programs in 36 counties with 8,236 families enrolled of which 91 percent were black. On a national basis the percentages of homemakers enrolled are 56 white, 34 black, 8 Hispanic, 1 American Indian, and 1 percent Asian.

New Jersey developed a ten lesson nutrition series in Spanish. These teaching materials emphasized Hispanic food habits, culture, and staple foods. Other topics included good nutrition, dental health, meal planning, weight control, and money-saving shopping tips. Since only 16 percent of EFNEP homemakers had the recommended number of servings of vegetables, New Mexico designed a pilot project to improve this situation. Paraprofessionals were trained in gardening, 2,500 seed packets were donated by a Northrup King Seed distributor, and they got the cooperation of the Albuquerque Public Schools as well as Head Start. A total of 134 gardens were planted and the families associated with those gardens ate more servings of vegetables per day while saving as much as \$300.

Current Activities--Youth Program:

From the beginning of the youth program to 1981, over 5.1 million youth have participated. In 1981, 575,119 youth participated in 4-H/EFNEP at

937 sites. More than 40,000 volunteers also gained increased nutrition knowledge through training and assisting with the 4-H EFNEP program. The objectives for the youth audiences are to educate them on the principles of food and nutrition, and contribute to the personal development of these low-income youth. Trained volunteers and paraprofessionals organize and teach nutrition education to children 9-12 years in age, in 4-H clubs, nutrition camps, and in special interest groups. Youth enrolled in 4-H/EFNEP are from families enrolled in EFNEP and from nonenrolled families. The impact of inflation over the past years has resulted in fewer staff and fewer people being served.

Selected Examples of Recent Progress:

A 4-H/EFNEP evaluation form, titled "What's Happening?" was used in four EFNEP sites in New York to evaluate impact of program on low income youth ranging in age from 9 to 19 years. Each site selected several knowledge and skill items they expected the majority of children to be able to accomplish by the end of the sessions. Three sites involved a total of 455 youth in 12 groups for an average of 5 sessions. At the completion of the program: approximately 75 percent of the children could name 10 foods needed for good health; knew that food affects how we feel, look, work and play; washed hands before preparing food; tasted new food at meetings; knew that advertising, friends, and environment can influence what we eat; and, could handle kitchen tools safely and properly. Approximately 50 percent could name the 4 food groups and what each group contributes to the diet.

Approximately 2,600 youth took part in 396 4-H/EFNEP groups in Florida last year through a nutrition series called "Design Your Diet," which focuses on the nutrients. As a result of their participation in these groups youth are learning the food groups, and are making progress in knowing the individual nutrients. Parents felt their children learned to eat better, cook simple dishes, and eat better snacks. In another 4-H/EFNEP project, 3,973 youth had richer summers by participating in day camping programs. In one county, a 4-H City Safari for 8-12 year olds involved 975 in a summer day camping program focused on better gardening and shopping practices. According to pre- and post-test results, campers improved their knowledge in the subject matter areas of consumer education and gardening.

In Kansas City, Missouri, 4-H Youth agents developed a central city urban 4-H gardening program to help youth and their families save money and learn about the nutritional value of vegetables. The program involved an inschool 4-H enrichment program, a followup 4-H special interest group, and EFNEP emphasis in cooperation with churches and other community organizations. City government and local churches donated in-kind resources of approximately \$4,000. Participants included 784 youth and many volunteer leaders. There was an increase in the amount of vegetables served in the homes of the youth and their gardens are estimated to have saved each family \$200 on food costs during the year. Surveys and food recalls indicate significant changes in family dietary habits as a result of the program.

Oregon Extension reports that Lane County schools include 4-H/EFNEP materials as part of the science curriculum in the 1st through 6th grades. The program involved 8,301 children from limited income areas, a 233 percent increase over the previous year. Teachers are reported to enthusiastically support the program, 90 percent describe EFNEP materials as an effective way of teaching basic nutrition, and 35 percent report noticeable changes in the children's eating habits.

SECTION F--RENEWABLE RESOURCES EXTENSION

Current Activities:

Every State (plus Puerto Rico, Virgin Islands, Guam and the District of Columbia) has increased renewable resources efforts because of the Renewable Resources Extension Act. Extension educational programs present information and management alternatives to owners (or lessees) of forest and rangeland. These programs include consideration for all the resources on these lands, but focus on the needs identified in the particular State. Nationally, the programs focus on forest management (58 percent of the funds); harvesting, processing, and marketing (12 percent); range management (11 percent); fish and wildlife management (10 percent); environmental management and public policy (6 percent); and, outdoor recreation (3 percent). The programs teach owners and users how to benefit by applying knowledge to capitalize on renewable resource opportunities. Since private forests and rangelands together make up about 35 percent of the U.S. land mass, and are owned by millions of private owners, the individual actions of owners can have a very significant impact on the total renewable resources produced in the Nation. Educational programs stimulate owners to manage their lands. The vast majority of them do not realize the potential of their renewable resource lands, let alone know how to manage them to maximize their desired outputs.

Selected Examples of Recent Progress:

Forest owners in 13 southern States are accelerating the regeneration of Southern Pine as a result of a region-wide educational program which developed 5 slide sets and two forestry investment computer programs, and made them available through county Extension offices throughout the South. Regeneration of Southern Pine is a high priority because a large proportion of harvested pine areas do not naturally regenerate with pine, but instead revert to less productive forest types.

Delaware has begun an Extension forestry program in cooperation with the State Department of Natural Resources. The Renewable Resources Extension Act provided the impetus to provide, for the first time, educational programs for small, private, non-industrial forest owners in Delaware.

Seventeen range States increased their education programs for ranchers as a direct result of Renewable Resources Extension Act funding. Programs in each State were tailored to specific needs,

but emphasized transferring technology which will lead to increased forage production while protecting other range resources.

Twenty States increased their educational programs in fish and wildlife management as a direct result of the Renewable Resources Extension Act funding. The major emphasis in these programs was improving wildlife habitat, aquaculture, and animal damage control.

The "Wood Can Last for Centuries" educational program which was developed in Louisiana by the Forest Service and Extension to reduce damage to homes by insects and decay has been expanded to 10 additional States in which losses to homes are appreciable. Nearly half of the homes in high-hazard States have some damage. Educational programs can help prevent additional damage, and minimize the cost of correcting existing damage.

Up-to-date timber marketing information, including price reports, is available through 1,200 county Extension offices. This information enables forest owners to realize a fair price for their products, thus it encourages additional production, and overcomes the lack of market information by timber growers who only sell at infrequent intervals.

PAYMENTS TO STATES

Federal funds are available for FY 1983 through the appropriation "Payments to States" for cooperative Extension work under the Smith Lever Act, the D.C. Public Postsecondary Education Reorganization Act, and section 1444 of the National Agricultural Research, Extension, and Teaching Policy Act of 1977 totaling \$328,654,000. Amounts appropriated are made available to States, Puerto Rico, Guam, the Virgin Islands, the District of Columbia, American Samoa, and Micronesia by letter of credit. Funds are disbursed in accordance with plans of work submitted by the States and approved by the Extension Service on behalf of the Secretary of Agriculture.

Use of these funds is indicated in the following tables:

Table I reflects estimated allotments to States, Puerto Rico, Guam, the Virgin Islands, the District of Columbia, American Samoa, and Micronesia under the formula provisions of Section 3(b) and 3(c) of the Smith-Lever Act.

Supplementary Tables 1A, 1B, and 1C reflect the estimated allotments for pesticide impact assessment: food and human nutrition education (EFNEP) and payments to the 1890 Land-Grant Colleges and Tuskegee Institute.

Table II Shows the basis on which the allotments will be made and the extent to which they must be matched by the State, County, and local sources.

Table III indicates the sources of funds allotted for cooperative Extension Work in the States, Puerto Rico, Guam, the Virgin Islands, the District of Columbia, American Samoa, and Micronesia for FY 1983

Table IV indicates the various classes of field agents employed employed with funds.

Table 1

APPROPRIATIONS FOR PAYMENTS TO STATES, STATE ALLOTMENTS, FY 1983 - 1984

Smith-Lever Act: Sec. 3(b) & 3(c)	FY 1983	Incr. or Decr. FY-1984	Total Proposed for FY-1984
Alabama	5,078,958	-0-	5,078,958
Alaska	721,320	-0-	721,320
American Samoa	618,400	-0-	618,400
Arizona	1,273,736	-0-	1,273,736
Arkansas	4,247,231	-0-	4,247,231
California	5,064,466	-0-	5,064,466
Colorado	1,993,968	-0-	1,993,968
Connecticut	1,505,143	-0-	1,505,143
Delaware	852,219	-0-	852,219
Florida	2,921,306	-0-	2,921,306
Georgia	5,622,383	-0-	5,622,383
Guam	649,235	-0-	649,235
Hawaii	923,254	-0-	923,254
Idaho	1,792,722	-0-	1,792,722
Illinois	6,691,432	-0-	6,691,432
Indiana	5,957,347	-0-	5,957,347
Iowa	6,234,458	-0-	6,234,458
Kansas	3,717,319	-0-	3,717,319
Kentucky	6,355,434	-0-	6,355,434
Louisiana	3,771,474	-0-	3,771,474
Maine	1,506,610	-0-	1,506,610
Maryland	2,287,095	-0-	2,287,095
Massachusetts	1,885,479	-0-	1,885,479
Michigan	6,039,766	-0-	6,039,766
Micronesia	664,800	-0-	664,800
Minnesota	5,949,537	-0-	5,949,537
Mississippi	5,295,017	-0-	5,295,017
Missouri	5,892,713	-0-	5,892,713
Montana	1,676,965	-0-	1,676,965
Nebraska	3,350,548	-0-	3,350,548
Nevada	727,948	-0-	727,948
New Hampshire	1,060,833	-0-	1,060,833
New Jersey	1,855,952	-0-	1,855,952
New Mexico	1,372,106	-0-	1,372,106
New York	5,755,653	-0-	5,755,653
North Carolina	8,499,302	-0-	8,499,302
North Dakota	2,334,944	-0-	2,334,944
Ohio	7,261,020	-0-	7,261,020
Oklahoma	3,805,505	-0-	3,805,505
Oregon	2,349,901	-0-	2,349,901
Pennsylvania	7,175,720	-0-	7,175,720
Puerto Rico	5,560,369	-0-	5,560,369
Rhode Island	726,169	-0-	726,169
South Carolina	4,165,368	-0-	4,165,368
South Dakota	2,401,267	-0-	2,401,267
Tennessee	6,184,468	-0-	6,184,468
Texas	8,550,791	-0-	8,550,791
Utah	1,120,648	-0-	1,120,648
Vermont	1,188,423	-0-	1,188,423
Virgin Islands	631,177	-0-	631,177
Virginia	5,128,414	-0-	5,128,414
Washington	2,785,668	-0-	2,785,668
West Virginia	2,987,839	-0-	2,987,839
Wisconsin	5,893,699	-0-	5,893,699
Wyoming	1,006,452	-0-	1,006,452
Subtotal	191,069,971	-0-	191,069,971
3(b) Special Need	1,544,909	-0-	1,544,909
3(c) ¹ Administration	5,483,120	-0-	5,483,120
TOTAL	198,098,000	-0-	198,098,000

Table 1A

APPROPRIATIONS FOR PAYMENTS TO STATES
PESTICIDE IMPACT ASSESSMENT, FY 1983 - 1984

Smith-Lever Act: Section 3(d)	FY 1983	Inc. or Dec. FY 1984	Total Proposed for FY-1984
Alabama	25,476	- 25,476	-0-
Alaska	8,528	- 8,528	-0-
Arizona	18,710	- 18,710	-0-
Arkansas	40,104	- 40,104	-0-
California	88,335	- 88,335	-0-
Colorado	19,778	- 19,778	-0-
Connecticut	11,387	- 11,387	-0-
Delaware	11,155	- 11,155	-0-
Florida	35,986	- 35,986	-0-
Georgia	56,499	- 56,499	-0-
Guam	8,665	- 8,665	-0-
Hawaii	11,409	- 11,409	-0-
Idaho	19,556	- 19,556	-0-
Illinois	79,949	- 79,949	-0-
Indiana	41,266	- 41,266	-0-
Iowa	76,744	- 76,744	-0-
Kansas	34,329	- 34,329	-0-
Kentucky	21,985	- 21,985	-0-
Louisiana	24,233	- 24,233	-0-
Maine	13,981	- 13,981	-0-
Maryland	17,127	- 17,127	-0-
Massachusetts	14,793	- 14,793	-0-
Michigan	33,665	- 33,665	-0-
Minnesota	51,628	- 51,628	-0-
Mississippi	40,376	- 40,376	-0-
Missouri	37,055	- 37,055	-0-
Montana	17,034	- 17,034	-0-
Nebraska	51,345	- 51,345	-0-
Nevada	9,872	- 9,872	-0-
New Hampshire	9,665	- 9,665	-0-
New Jersey	15,294	- 15,294	-0-
New Mexico	12,128	- 12,128	-0-
New York	30,538	- 30,538	-0-
North Carolina	45,990	- 45,990	-0-
North Dakota	21,338	- 21,338	-0-
Ohio	42,017	- 42,017	-0-
Oklahoma	27,810	- 27,810	-0-
Oregon	21,159	- 21,159	-0-
Pennsylvania	25,456	- 25,456	-0-
Puerto Rico	8,557	- 8,557	-0-
Rhode Island	10,575	- 10,575	-0-
South Carolina	26,672	- 26,672	-0-
South Dakota	20,266	- 20,266	-0-
Tennessee	23,877	- 23,877	-0-
Texas	78,280	- 78,280	-0-
Utah	11,776	- 11,776	-0-
Vermont	10,353	- 10,353	-0-
Virgin Islands	9,025	- 9,025	-0-
Virginia	24,058	- 24,058	-0-
Washington	27,439	- 27,439	-0-
West Virginia	11,658	- 11,658	-0-
Wisconsin	35,122	- 35,122	-0-
Wyoming	10,977	- 10,977	-0-
Subtotal	1,481,000	-1,481,000	-0-
Special Project	235,000	- 235,000	-0-
TOTAL	1,716,000	-1,716,000	-0-

Table 1B

APPROPRIATIONS FOR PAYMENTS TO STATES
FOOD AND HUMAN NUTRITION EDUCATION, FY 1983-1984

Smith-Lever Act: Sec. 3(d)	FY 1983	Incr. or Decr. FY-1984	Total Proposed for FY-1984
Alabama	1,930,631	- 772,184	1,158,447
Alaska	170,104	- 71,060	99,044
American Samoa	62,048	- 12,048	50,000
Arizona	550,975	- 233,819	317,156
Arkansas	1,230,693	- 492,892	737,801
California	3,253,522	- 1,440,739	1,812,783
Colorado	546,323	- 232,283	314,040
Connecticut	446,033	- 191,195	254,838
Delaware	217,492	- 90,405	127,087
Florida	1,997,263	- 841,932	1,155,331
Georgia	2,101,848	- 840,577	1,261,271
Guam	62,253	- 12,253	50,000
Hawaii	253,063	- 104,165	148,898
Idaho	286,884	- 119,291	167,593
Illinois	2,088,948	- 874,415	1,214,533
Indiana	1,176,353	- 475,942	700,411
Iowa	882,051	- 349,898	532,153
Kansas	678,957	- 277,672	401,285
Kentucky	1,622,705	- 651,213	971,492
Louisiana	1,830,480	- 753,048	1,077,432
Maine	412,377	- 166,887	245,490
Maryland	825,893	- 343,596	482,297
Massachusetts	952,395	- 401,548	550,847
Michigan	1,743,072	- 712,378	1,030,694
Micronesia	68,403	- 18,403	50,000
Minnesota	971,370	- 392,480	578,890
Mississippi	1,669,638	- 670,103	999,535
Missouri	1,517,459	- 614,516	902,943
Montana	291,125	- 120,417	170,708
Nebraska	526,829	- 212,790	314,039
Nevada	168,372	- 72,445	95,927
New Hampshire	233,803	- 97,369	136,434
New Jersey	1,051,598	- 450,897	600,701
New Mexico	498,513	- 209,401	289,112
New York	3,341,357	- 1,435,098	1,906,259
North Carolina	2,459,639	- 967,793	1,491,846
North Dakota	336,655	- 134,788	201,867
Ohio	2,145,890	- 881,504	1,264,386
Oklahoma	1,028,013	- 421,080	606,933
Oregon	484,154	- 207,505	276,649
Pennsylvania	2,634,568	- 1,074,173	1,560,395
Puerto Rico	1,409,271	- 743,136	666,135
Rhode Island	296,990	- 123,166	173,824
South Carolina	1,486,566	- 586,739	899,827
South Dakota	380,162	- 153,368	226,794
Tennessee	1,929,426	- 770,980	1,158,446
Texas	4,105,005	- 1,681,508	2,423,497
Utah	302,778	- 128,954	173,824
Vermont	229,944	- 93,510	136,434
Virgin Islands	61,110	- 11,110	50,000
Virginia	1,648,300	- 658,113	990,187
Washington	666,445	- 283,856	382,589
West Virginia	952,946	- 380,288	572,658
Wisconsin	936,859	- 386,012	550,847
Wyoming	184,969	- 76,578	108,391
Special Studies	800,000	- 800,000	-0-
Undistributed	-0-	-0-	-0-
Subtotal	60,140,520	- 25,319,520	34,821,000
Federal Administration	213,480	- 213,480	-0-
TOTAL	60,354,000	- 25,533,000	34,821,000

Table 1C
APPROPRIATIONS FOR PAYMENTS TO THE 1890 LAND-GRANT COLLEGES AND TUSKEGEE
INSTITUTE

FISCAL YEAR 1983 - 1984

Food and Agr'l Act: Section 1444	FY 1983	Incr.or Decr. FY 1984	Proposed for FY 1984
ALABAMA:			
Alabama A&M University	859,276	-0-	859,276
Tuskegee Institute	859,276	-0-	859,276
ARKANSAS:			
Univ. of Arkansas at Pine Bluff	756,611	-0-	756,611
DELAWARE:			
Delaware State College	284,503	-0-	284,503
FLORIDA:			
Florida A&M University	674,328	-0-	674,328
GEORGIA:			
Fort Valley State College	996,160	-0-	996,160
KENTUCKY:			
Kentucky State University	1,200,214	-0-	1,200,214
LOUISIANA:			
Southern Univ. and A&M College	717,205	-0-	717,205
MARYLAND:			
Univ. of Maryland Eastern Shore	541,772	-0-	541,772
MISSISSIPPI:			
Alcorn State University	865,952	-0-	865,952
MISSOURI:			
Lincoln University	1,197,312	-0-	1,197,312
NORTH CAROLINA:			
North Carolina A&T State Univ.	1,532,268	-0-	1,532,268
OKLAHOMA:			
Langston University	743,627	-0-	743,627
SOUTH CAROLINA:			
South Carolina State College	761,859	-0-	761,859
TENNESSEE:			
Tennessee State University	1,143,013	-0-	1,143,013
TEXAS:			
Prairie View A&M University	1,487,528	-0-	1,487,528
VIRGINIA:			
Virginia State College	970,456	-0-	970,456
Subtotal	15,591,360	-0-	15,591,360
Federal Administration	649,640	-0-	649,640
TOTAL	16,241,000	-0-	16,241,000

TABLE II

APPROPRIATION FOR PAYMENTS TO STATES

BASIS OF ALLOTMENT AND MATCHING REQUIRED, FISCAL YEAR 1984

Item	Total Estimate 1984	Allotment	Amount Paid Without Matching	Amount Required Matching
Smith-Lever Act:	:265,197,000	:	:	:
Section 3(b)	:	:\$ 56,475,091 - Fixed by	:\$14,513,808	:\$ 41,961,283
	:	Section 3(b)	:	:
	:	by PL 87-749	:	:
	:	1,544,909 - Special need	--	1,544,909
Section 3(c)	:	140,078,000 -	5,483,120	134,594,880
	:	53,757,952 - by farm pop-	:	:
	:	ulation	:	:
	:	53,757,952 - by rural	:	:
	:	population	:	:
	:	27,078,976 - equally; and	:	:
	:	5,483,120 - for federal	:	:
	:	administra-	:	:
	:	tion and co-	:	:
	:	ordination	:	:
	:	Sec. 3(c) 1	:	:
Retirement & Employee Compens-	:	:	:	:
sation Cost	:	16,033,000 - Federal con-	16,033,000	--
	:	tribution to	:	:
	:	these funds	:	:
Penalty Mail	:	16,245,000 - Reimbursement:	16,245,000	--
	:	to the Post-	:	:
	:	al Service	:	:
Section 3(d)	:	34,821,000 - 10% equally,	34,821,000	--
	:	balance on %	:	:
	:	of poor in	:	:
	:	U.S. paid to	:	:
	:	50 states,	:	:
	:	and Puerto	:	:
	:	Rico. \$50,000:	:	:
	:	each to Am.S,	:	:
	:	Guam, Micro-	:	:
	:	nesia, & V.I.:	:	:
Title XIV, Food & Agr'l Act, 1977	:16,241,000	16,241,000 - 4% Federal	16,241,000	--
Section 1444, as	:	Adm., balance:	:	:
amended, 1890	:	paid to 1980	:	:
Land-Grant	:	Colleges and	:	:
Colleges	:	Tuskegee	:	:
D.C. Public	:983,000	983,000	:	:
Postsecondary	:	943,680 - to District	39,320	943,680
Education	:	of Columbia	:	:
Reorganization	:	39,320 - for Federal	:	:
Act	:	Administra-	:	:
	:	tion & Coord.:	:	:
TOTAL	:282,421,000	:282,421,000	:103,376,248	:179,044,752

Table III
SOURCES OF FUNDS ALLOTTED FOR COOPERATIVE EXTENSION WORK
For Fiscal Year Ending September 30, 1983

States	Grand Total	Total Federal Funds	Total Within States	Funds from Federal Sources				Funds from Non-Federal Sources			
				Retirement	Smith-Lever Act		Renewable Res. Extension Act	Section 1444 Evans-Allen Act	State (Est.)	County (Est.)	Non-Tax (Est.)
					Penalty Mail	All Other					
Alabama	21,366,692	9,943,703	11,422,989	442,633	408,505	7,305,225	68,788	1,718,552	9,328,383	1,846,912	247,694
Alaska	5,289,176	1,133,968	4,155,208	69,970	41,046	1,002,952	20,000	-	4,105,208	-	50,000
American Samoa	696,054	696,054	-	-	15,606	680,448	-	-	-	-	-
Arizona	7,331,944	2,357,726	4,974,218	157,705	118,900	2,061,121	20,000	-	4,546,018	203,200	225,000
Arkansas	17,172,070	7,286,354	9,885,716	355,468	312,781	5,801,418	60,076	756,611	8,663,467	1,175,896	46,353
California	46,158,320	9,694,731	36,463,589	56,838	647,040	8,920,323	70,530	-	27,683,021	6,141,482	2,639,086
Colorado	14,467,909	3,180,696	11,287,213	224,811	193,104	2,734,069	28,712	-	5,917,201	4,605,981	764,031
Connecticut	3,517,759	2,189,133	1,328,626	17,858	115,712	2,035,563	20,000	-	1,328,626	-	-
Delaware	2,618,413	1,555,927	1,062,486	47,016	50,542	1,153,866	20,000	284,503	863,240	20,000	179,246
Florida	27,192,543	6,828,155	20,364,388	449,977	382,416	5,273,555	47,879	674,328	11,046,435	9,057,653	260,300
Georgia	36,417,152	10,552,587	25,864,565	670,092	528,892	8,281,685	75,758	996,160	18,595,963	4,110,787	3,157,815
Guam	1,186,697	777,042	409,655	-	25,889	731,153	20,000	-	409,655	-	-
Hawaii	4,541,753	1,392,187	3,149,566	40,950	70,511	1,260,726	20,000	-	3,149,566	-	-
Idaho	6,997,763	2,618,379	4,379,384	149,854	139,462	2,279,442	49,621	-	2,957,166	1,412,618	9,600
Illinois	26,601,208	10,594,164	16,007,044	513,496	625,884	9,424,329	30,455	-	12,559,915	1,587,173	1,859,956
Indiana	21,471,646	8,284,219	13,187,427	391,568	492,200	7,376,966	23,485	-	6,134,956	6,202,471	850,000
Iowa	24,570,445	8,353,087	16,217,358	436,891	438,943	7,457,253	20,000	-	10,033,950	5,946,230	237,178
Kansas	23,593,346	5,493,620	18,099,726	487,740	346,775	4,639,105	20,000	-	6,877,722	8,635,769	2,586,235
Kentucky	24,569,918	10,350,714	14,219,204	529,830	480,864	8,104,124	35,682	1,200,214	9,801,001	4,418,203	-
Louisiana	24,207,226	7,732,535	16,474,691	504,659	376,326	6,072,527	61,818	717,205	15,846,446	610,838	17,407
Maine	4,567,825	2,287,300	2,280,525	95,771	103,197	2,036,968	51,364	-	1,927,025	310,000	33,500
Maryland	12,496,457	4,431,777	8,064,680	254,339	218,803	3,396,863	20,000	541,772	6,081,614	1,568,907	414,159
Massachusetts	7,826,873	3,372,156	4,454,717	21,922	218,340	3,106,667	25,227	-	1,279,588	3,175,129	-
Michigan	21,994,590	9,126,676	12,867,914	461,615	476,452	8,135,503	53,106	-	12,038,863	829,051	-
Micronesia	754,341	754,341	-	-	21,138	733,203	-	-	-	-	-
Minnesota	24,365,447	8,187,078	16,178,369	471,406	470,970	7,205,535	39,167	-	10,335,479	5,755,897	86,993
Mississippi	23,165,019	9,088,156	14,076,863	433,535	368,605	7,354,761	65,303	865,952	11,472,811	1,565,395	1,038,657
Missouri	23,442,836	9,990,064	13,452,772	438,138	481,805	7,840,612	32,197	1,197,312	9,517,394	2,417,447	1,517,931
Montana	7,256,474	2,484,546	4,771,928	135,105	125,108	2,183,424	40,909	-	2,223,980	2,188,819	359,129
Nebraska	15,865,433	4,807,779	11,057,654	307,589	274,168	4,206,022	20,000	-	6,302,995	4,016,212	738,447
Nevada	3,215,103	1,197,562	2,017,541	75,897	48,373	1,053,292	20,000	-	1,670,015	347,526	-
New Hampshire	3,462,479	1,563,874	1,898,605	81,516	78,087	1,377,301	26,970	-	988,899	894,706	15,000
New Jersey	10,512,683	3,606,838	6,905,845	201,411	208,583	3,176,844	20,000	-	3,817,875	3,087,970	-
New Mexico	7,056,056	2,333,653	4,722,403	152,178	108,228	2,053,247	20,000	-	3,634,000	1,088,403	-
New York	36,012,807	10,737,168	25,275,639	253,815	672,669	9,764,548	46,136	-	6,708,181	15,460,794	3,106,664
North Carolina	38,501,219	14,378,448	24,122,771	789,788	732,506	11,256,841	67,045	1,532,268	16,625,541	7,138,315	358,915
North Dakota	8,949,365	3,249,859	5,699,506	194,622	164,300	2,870,937	20,000	-	3,094,433	1,915,566	689,507
Ohio	26,171,432	10,742,763	15,428,669	309,437	567,460	9,831,927	33,939	-	6,735,661	8,007,593	685,415
Oklahoma	21,256,640	6,551,940	14,704,700	353,451	318,542	5,114,578	21,742	743,627	10,289,700	3,455,000	960,000
Oregon	12,782,600	3,595,465	9,187,135	288,300	202,936	3,030,214	74,015	-	6,081,460	2,303,154	802,521
Pennsylvania	20,483,766	10,983,766	9,500,000	194,037	608,652	10,122,744	58,333	-	6,000,000	3,500,000	-
Puerto Rico	11,784,285	7,564,462	4,219,823	157,720	353,545	7,033,197	20,000	-	2,556,116	1,015,056	648,651
Rhode Island	1,898,829	1,185,530	713,299	21,122	49,674	1,094,734	20,000	-	653,299	60,000	-
South Carolina	18,245,134	7,420,259	10,824,875	367,999	325,862	5,909,691	54,848	761,859	10,758,875	56,000	10,000
South Dakota	7,536,825	3,295,233	4,241,592	160,461	173,077	2,941,695	20,000	-	2,733,065	1,447,007	61,520
Tennessee	22,420,060	10,634,980	11,785,080	471,452	479,002	8,498,861	42,652	1,143,013	9,064,779	2,431,301	289,000
Texas	24,619,121	17,328,684	7,290,437	1,210,822	917,892	13,648,881	63,561	1,487,528	5,288,637	1,800,000	201,800
Utah	6,764,115	1,839,689	4,924,426	116,770	99,717	1,603,202	20,000	-	3,884,720	969,706	70,000
Vermont	4,055,241	1,673,404	2,381,837	76,574	75,110	1,501,720	20,000	-	2,045,878	287,000	48,959
Virgin Islands	1,184,864	759,864	425,000	4,926	22,626	712,312	20,000	-	425,000	-	-
Virginia	31,436,660	9,111,060	22,325,600	673,202	473,039	6,937,772	56,591	970,456	17,112,400	5,213,200	-
Washington	15,531,442	4,180,442	11,351,000	255,663	235,954	3,616,552	72,273	-	6,728,000	3,400,000	1,223,000
West Virginia	8,941,931	4,471,950	4,469,981	187,925	212,158	4,034,443	37,424	-	2,085,335	2,372,515	12,131
Wisconsin	29,231,057	8,211,363	21,019,694	509,247	473,042	7,184,680	44,394	-	12,762,187	7,789,215	468,292
Wyoming	5,339,832	1,534,137	3,805,695	119,757	73,982	1,320,398	20,000	-	2,550,237	1,255,458	-
Unallotted	1,536,381	1,536,381	-	-	-	1,536,381	-	-	-	-	-
GRAND TOTAL	860,633,256	315,233,628	545,399,628	15,394,868	16,245,000	266,022,400	1,980,000	15,591,360	365,331,981	153,097,555	26,970,092

District of Columbia 1/ 2,199,169 963,680 1,235,489 - 943,680 20,000 - 1,235,489 -

Table IV

COOPERATIVE EXTENSION AGENTS, BY ORGANIZATION CLASSES
(Full-Time Equivalents)

Extension Workers by Organization Classes	Fiscal Year 1981	Fiscal Year 1982	Fiscal Year 1983
<u>State Workers:</u>			
Directors and Administrative personnel.....	508	507	506
Specialists.....	3714	3706	3639
Total, State Staff.....	4222	4213	4145
<u>County Workers:</u>			
Leaders and Supervisors.....	675	651	631
Area Agents.....	671	629	581
County Extension Agents.....	11,441	11,240	10,957
Total, County Staff.....	12,787	12,520	12,169
GRAND TOTAL.....	17,009	16,733	16,314 ^{a/}

^{a/} Estimate based on preliminary data available at the beginning of the fiscal year.

NATIONAL AGRICULTURAL LIBRARY

Purpose Statement

The National Agricultural Library (NAL) had its mission outlined by the Organic Act of 1862, establishing the Department of Agriculture. The act sets forth a mission, "to acquire and to diffuse among the people of the United States useful information on subjects connected with agriculture in the most comprehensive and general sense of the word," and placed upon the Secretary the responsibility to "procure and preserve all information concerning agriculture which he can obtain by means of books..."

NAL has as its ultimate purpose the dissemination of useful information about agricultural and other related sciences to scientists and researchers, administrators and managers, farmers, and to the general public. In addition to providing traditional library services such as bibliographies, reference services and document delivery to agricultural scientists and researchers, NAL is expanding its role and serving a wider audience by using modern information dissemination technology to its fullest. Traditionally, the library has concentrated its thrust towards the agricultural scientist and researchers. The wider audience includes Federal, State and local administrators, as well as the farmer, the small businessman, public groups at all levels, and the general public.

With approximately 1.6 million volumes of printed material on agriculture and supporting scientific disciplines, NAL has one of the largest collections of its kind in the world. Both current and historical information is collected and organized for effective utilization by a wide range of users. NAL also provides input of U.S. publications to AGRIS, the International Information System for the Agricultural Sciences and Technology.

NAL operations are carried out at the National Agricultural Library Building at Beltsville, Maryland. Specialized services are provided from a branch library in Washington D. C., which includes social sciences materials. Service is provided from these locations as well as 18 officially designated field libraries in the States and 30 "information" centers containing a total of approximately a quarter of a million volumes.

As of September 30, 1982 the NAL employment was 158 full time and 15 other all located in Beltsville and Washington.

NATIONAL AGRICULTURAL LIBRARY

Available Funds and Staff-Years

1982 Actual and Estimated, 1983 and 1984

Item	1982		1983		1984	
	Actual	Staff:	Estimated	Staff:	Estimated	Staff
	Amount	Years	Amount	Years	Amount	Years
National Agricultural Library.....	\$7,626,600	184	\$8,732,200	180	\$9,873,000	200
Obligations under other USDA						
appropriations:						
Agricultural Marketing Service:						
Library space.....	14,977	--	10,411	--	10,411	--
Food and Nutrition Service:						
Library space.....	23,688	--	23,688	--	23,688	--
Cooperative State Research Service:						
Library space.....	21,002	--	21,002	--	21,002	--
Food and Nutrition Information Center:						
Fedlink OCLC terminal.....	--	--	2,863	--	2,863	--
Animal and Health Inspection Service:						
Modum Charges for computer hookup.....	3,240	--	--	--	--	--
Extension Service						
Library space.....	9,454	--	9,454	--	9,454	--
Catalog and maintain public and audio						
materials development in support of						
Pesticide Application Training						
program (PAT).....	--	--	26,203	--	26,203	--
Agricultural Research Service:						
Library space.....	31,453	--	31,453	--	31,453	--
Modum charges for computer hookup, SR..	3,000	--	--	--	--	--
Modum charges for computer hookup, NCR:	3,000	--	--	--	--	--
Current Awareness Literature Service..	443,000	--	443,000	--	443,000	--
Forest Service:						
Fedlink with Ohio College Library						
Center	1,188	--	1,188	--	1,188	--
Lodgepole pine literature document						
Delivery.....	5,000	--	--	--	--	--
Office of International Cooperation and						
Development:						
Information Services for AID.....	182,225	--	108,938	--	108,938	--
Computerized data base on soils of the:						
tropics.....	--	--	11,800	--	11,800	--
Conversion and utilization of biblio-						
graphic records from land-grant						
Universities.....	--	--	120,000	--	120,000	--
Coordination of International Agricul-						
tural bibliographic and information						
activities.....	--	--	100,000	--	100,000	--
Literature aquisition and collection						
support.....	--	--	60,000	--	60,000	--
Training and orientation of agricul-						
tural information and library spec-						
ialists of lesser developed countries:	--	--	150,000	--	150,000	--
Reference of bibliographic tools for						
international agriculture.....	--	--	120,000	--	120,000	--
Total, Other USDA Appropriations...	741,227	--	1,240,000	--	1,240,000	--
Total Agricultural Appropriations..	8,367,827	184	9,972,200	180	11,113,000	200
Other Federal Funds:						
Department of Energy: Ethanol production:	12,000	--	--	--	--	--
Library of Congress: Library services	15,000	1	--	--	--	--
Non-Federal Funds						
Sale of photocopies.....	70,271	1	60,000	1	60,000	1
Total National Agricultural						
Library.....	8,465,098	186	10,032,200	181	11,173,000	201

Full-Time Equivalent Staff-year:

	1982	1983	1984
	Actual	Estimated	Estimated
Ceiling.....	175	170	190
Non-Ceiling.....	11	11	11
Total.....	186	181	201

UNITED STATES DEPARTMENT OF AGRICULTURE
NATIONAL AGRICULTURAL LIBRARY
PERMANENT POSITIONS BY GRADE AND STAFF-YEAR SUMMARY
1982 and Estimated 1983 and 1984

GRADE	1982 HEADQUARTERS	1983 HEADQUARTERS	1984 HEADQUARTERS
ES - 5	1	1	1
GS/GM-15	3	3	3
GS/GM-14	3	3	3
GS/GM-13	14	14	14
GS-12	9	9	10
GS-11	36	36	44
GS-9	5	5	9
GS-8	4	4	5
GS-7	18	18	23
GS-6	34	34	38
GS-5	39	39	38
GS-4	8	8	13
GS-3	2	2	2
GS-2	2	2	2
GS-1	1	1	--
Total, Permanent Positions:	179	179	205
Staff-Years:			
Ceiling	175	170	190
Non-ceiling	11	11	11
Total, Staff Years.....	186	181	201

NATIONAL AGRICULTURAL LIBRARY

CLASSIFICATION BY OBJECTS

1982 and Estimated 1983 and 1984

	<u>1982</u>	<u>1983</u>	<u>1984</u>
Personnel Compensation:			
Headquarters.....	<u>\$3,449,108</u>	<u>\$3,700,000</u>	<u>\$4,368,000</u>
11 Total personnel Compensation.....	3,449,108	3,700,000	4,368,000
12 Personnel Benefits	<u>341,863</u>	<u>365,000</u>	<u>430,000</u>
Total Pers. Comp. & Benefits.....	<u>3,790,971</u>	<u>4,065,000</u>	<u>4,798,000</u>
Other Objects:			
21 Travel.....	44,668	50,000	50,000
22 Transportation of things.....	11,003	15,000	15,000
23.2 Communications, utilities and other rent.....	1,252,615	1,377,000	1,615,000
24 Printing and reproduction.....	37,404	40,000	40,000
25 Other services.....	1,044,937	1,785,200	1,754,000
26 Supplies and materials.....	1,013,262	1,200,000	1,351,000
31 Equipment.....	<u>208,663</u>	<u>200,000</u>	<u>250,000</u>
Total other objects..:	<u>3,612,552</u>	<u>4,667,200</u>	<u>5,075,000</u>
Total direct obligations	<u>7,403,523</u>	<u>8,732,200</u>	<u>9,873,000</u>
<u>Position Data:</u>			
Average Salary, ES positions.....	58,500	65,500	65,500
Average Salary, GS positions.....	21,264	23,076	24,371
Average Grade GS positions.....	7.9	7.9	7.9

NATIONAL AGRICULTURAL LIBRARY

The estimates include proposed changes in the Language of this item as follows (new language underscored; deleted matter enclosed in brackets).

National Agricultural Library

For necessary expenses of the National Agricultural Library, [\$8,849,000] \$9,873,000 Provided, That this appropriation shall be available for employment pursuant to the second sentence of section 706 (a) of the Organic Act of 1944 (7 U.S.C. 2225), and not to exceed \$35,000 shall be available for employment under 5 U.S.C. 3109; Provided further, That not to exceed \$575,000 shall be available pursuant to 7 U.S.C. 2250 for the alteration and repair of buildings and improvements. (Public Law 97-370 agencies 1983).

NATIONAL AGRICULTURAL LIBRARY

Appropriation Act, 1983.....	8,849,000
Budget Estimate, 1984.....	9,873,000
Increase in Appropriation.....	<u>+1,024,000</u>

Adjustments in 1983

Appropriation Act, 1983.....	8,849,000
Activities transferred to the Office of the	
General Counsel a/.....	-223,800
Transferred to Office of the Secretary b/	-4,000
1983 Supplemental Appropriation for pay costs.....	<u>+111,000</u>
Adjusted Base for 1984.....	8,732,200
Budget Estimate, 1984.....	9,873,000
Increase over adjusted, 1984.....	<u>+1,140,800</u>

a/ Pursuant to Secretary's Memorandum No. 1020-5 on February 19, 1982 the law library functions were transferred from this account to the Office of the General Counsel. Actual transfer of funds of \$223,800 were made in 1983. On a comparable basis the full annual costs of the activity including pay costs is \$228,400 for 1983 and 1984.

b/ Pursuant to Section 1414, Public Law 97-98 an office for Assistant Secretary, Science and Education has been established. Actual transfer of funds of \$4,000 are anticipated in 1983. On a comparable basis the full annual costs of the activity including pay costs is \$4,000 for 1983 and 1984.

SUMMARY OF INCREASES
(On basis of adjusted appropriation)

Item of Change	1983 Estimated	Program Changes	1984 Estimated
Extend Hours of Service and Improve Quality and Timeliness of Service.....	- -	+\$251,000	\$251,000
Purchase of Books, Journals, and Materials in Other Formats; Special Access Services.....	\$900,000,	+320,800	1,220,800
Timely Processing and Input into the AGRICOLA Data base.....	- -	+212,000	212,000
Center of Excellence.....	70,000	+120,000	190,000
Repair and Maintenance of Facilities.....	200,000	+100,000	300,000
All Other.....	7,562,200	+137,000 a/	7,699,200
TOTAL AVAILABLE.....	<u>8,732,200</u>	<u>+1,140,800</u>	<u>9,873,000</u>

a/ Includes a total increase of \$137,000 for the portion of pay increases effective in FY 1983 which were absorbed in FY 1983 but which are needed to carry out the programs proposed in FY 1984.

PROJECT STATEMENT
(on basis of adjusted appropriation)

Project	1982 Actual	1983 Estimated:	1984 Estimated:
	Staff:	Staff:	Staff:
	Amount	Amount	Amount
	Years	Years	Years
1. Agricultural Library			
Services for Research			
and Education:	\$7,403,523: 173	\$8,532,200: 175	+\$1,040,800(1): 175
2. Repair and Maintenance			
of Facilities.....	- - : - -	200,000: - -	+100,000(2): 300,000: - -
Unobligated Balance.....	223,077: - -	- - : - -	- - : - -
Total available or estimate:	7,626,600: 173	8,732,200: 175	1,140,800 : 9,873,000: 200
Transfer to Office of the			
General Counsel.....	+226,400: +5	+223,800: +5	
Transfer to Human Nutrition			
Information Service.....	+471,000: +6	- - : - -	
Transfer to Office of the			
Secretary.....	+4,000: - -	+4,000: - -	
SLUC and Advisory Committee:	+422,000: - -	- - : - -	
Proposed supplemental for			
pay cost increase.....	- - : - -	-111,000: - -	
Total, Appropriation.....	8,750,000: 184	8,849,000: 180	

EXPLANATION OF PROGRAM

The basic function of the National Agricultural Library (NAL) is to identify, acquire, disseminate, and deliver pertinent food and agriculture information to all scientists, researchers, administrators, and others working in agricultural fields in both the government and private sectors. To meet user needs, NAL maintains an extensive collection of agricultural publications and provides access to these publications through AGRICOLA, its master data base. The Library also provides current awareness and retrospective searches on worldwide agricultural literature through other computer-based systems of interest to agricultural scientists and educators.

A national education and training program designed to inform actual and potential users of NAL about its operation, resources, and services continues to expand. The emphasis in this program is on the use of online bibliographic files and other computer services.

Acquisitions of agricultural materials from 150 countries and in more than 30 languages continues to be a major activity in carrying out the mission of the library components of NAL. Other primary activities for fiscal years 1983 and 1984 are as follows:

<u>Types of Activities</u>	<u>Estimated Productivity</u>	
	<u>FY 1983</u>	<u>FY 1984</u>
Serial Issues Added	180,000	200,000
Number of Titles Cataloged	16,000	17,500
Articles Indexed	120,000	130,000
Volumes Bound	18,000	25,000
Document Requests Filled	250,000	300,000
Reference Inquiries Answered	50,000	58,000
Automated Searches Conducted	10,000	12,000
Current Awareness (CALS) Searches	285,000	295,000
Current Awareness (CALS) Profiles by all data bases	15,500	17,000

A major function of the bibliographic program is organization of materials for use of researchers and announcement of newly published research to the agricultural community. This includes cataloging books and journals acquired for the collection, and indexing journal articles, conference proceedings, and reports selected for their importance to agricultural research and education.

Resources of the collection are made available through direct loan, interlibrary loan of books, and photocopy of journal articles. Requests for documents from USDA field employees are handled locally in 30 States in cooperation with land-grant university libraries whenever possible, with NAL serving as a backup for document delivery.

NAL resources and services continue to expand to meet the escalating information needs of agricultural communications and the general public. An increased number of State 4-H and adult Extension publications and the large international collection of the Land-Tenure Center Library were made available to users. A floriculture collection was donated as a possible basis for a specialized information center. A landmark guide to research literature was cosponsored to assist scientists, researchers, and librarians. The bibliographic data base of the United Nations food and agriculture organization was offered in this country for the first time through arrangements with the Library.

The possibilities for significant breakthroughs in the electronic dissemination of information to rural audiences were explored by NAL. The Library and the Congressional Research Service participated in a congressional hearing on computer-based information services in agriculture and NAL was the receiving station

for a video teleconference transmitted via satellite from Denver, Colorado. Participation in an information technology center for the demonstration of the latest computer systems was projected with the Office of Information Resources Management and the USDA Graduate School. The national electronic mail network established in cooperation with the Extension Service and the Office of Governmental and Public Affairs grew significantly with NAL planning network use for interlibrary loans and retrieval services on the AGRICOLA data base.

In addition, NAL must provide for collection preservation. This involves the microfilming and restoring of important documents, unbound serial issues, newspapers, and historical materials. A nationwide project to film the documents of all land-grant institutions--bulletins, circulars, reports, and other land-grant publications--before documents themselves deteriorate, is currently underway. The project is being conducted by NAL in conjunction with a private microfilming firm and land-grant institutions. The result is a collection which covers a period of time from the late 1890's into the 1970's. The collection is both a valuable research tool for a wide variety of subjects and a practical reference resource for the farmer and the lay public.

As requested by the Secretary of Agriculture a Blue Ribbon Panel (Interagency Panel for the Assessment of the National Agricultural Library) study was completed and recommendations submitted. The panel made a number of recommendations designed to improve the Library's status as a central national information resource for agriculture and related sciences. The fiscal year 1984 increases are directly related to those recommendations. The Blue Ribbon Panel specifically recommended extension of hours of service to cover the needs of USDA and outside users. The Panel pointed out that limited resources and increasing prices have reduced NAL's ability to update its collections and to build major collections in new areas of interest. The Panel stressed the need for NAL to become a repository for agricultural databases to better serve its users. The panel strongly recommended adoption of standards by NAL for bibliographic participation in National and International programs. The Blue Ribbon Panel recommended that NAL assume the leadership role in the development of a national agricultural information network which will include a number of centers of excellence.

Justification of Increases

- (1) An increase of \$1,040,800 for services consisting of:
 - (a) An increase of \$137,000 for annualization of pay that was absorbed in fiscal year 1983 that is necessary to carry out the program in fiscal year 1984.
 - (b) An increase of \$251,000 to extend hours of service and improve quality and timeliness of service. (No funds in FY 1983).

Need for Change. NAL has reached a critical point beyond which it will be able to provide only minimal library and information support services to the user. Additional library personnel are required to extend hours of service and to reduce turnaround time for reference and loan requests. The Blue Ribbon Panel specifically recommended extension of hours of service to cover needs of USDA and outside users. With this proposal, NAL plans to extend hours of service for an additional 4 hours each evening Monday - Friday, 8 hours on Saturday, and 4 hours on Sunday. Provision of evening and weekend service is viewed by the Panel as urgent, if NAL is to function as a true National library.

Nature of Change. Resources in the collection are made available through direct loan, interlibrary loan of books, and photocopy of journal articles. Requests for documents from USDA field employees are handled locally in 27 states in cooperation with land-grant university libraries with NAL serving as a back-up. Interlibrary loan and photocopy services will be strengthened through use of electronic communications systems to permit immediate transfer of copies as necessary to locations within the National Agricultural Information network or anywhere else the capability exists to receive it.

- (c) An increase of \$320,800 for purchase of books, journals, and materials in other formats; special access services. (\$900,000 available in FY 1983).

Need for Change. Acquisition of agricultural publications continues to be a major activity in carrying out the mission of NAL. The Blue Ribbon Panel pointed out that limited resources and increasing prices of library materials (20% in agricultural books per year; 20% in agricultural journals per year) have reduced NAL's ability to update its collections and to build major collections in new areas of interest.

The function of NAL is to identify, acquire, and disseminate agricultural information to all scientists, researchers, administrators, nutritionists, extension specialists, and others working in agriculture or related fields in both government and private sectors. To meet user needs, NAL provides current and retrospective searches on worldwide agricultural literature. The Blue Ribbon Panel stressed the need for NAL to become a repository for agricultural databases to better serve its users. Acquisition of agricultural-oriented databases through lease of tapes and payment for access will improve this service. For example NAL will acquire and provide Current Awareness Service from a new commercial Database in biotechnology. It also will acquire and provide document delivery from an associated microform set of all documents listed in that database. NAL will also improve USDA user access to chemical information.

The high cost of current awareness tape use for a leading chemical database forced NAL to substitute access to a less costly file last year. NAL will explore returning to use of the more satisfactory file in FY 84. It will also investigate the possibility of purchasing the right to use data on agricultural dissertations from an existing system rather than creating its own bibliographic records.

Nature of Change. The increase will be used to update the current collection. Many subject areas are now not adequately covered. For example, one major new thrust of the Department includes the marketing of agricultural products overseas. NAL plans to build a significant base in marketing, economics, and trade data to support this effort and to improve the reference and statistical collections.

- (d) An increase of \$212,000 for timely processing and input into the AGRICOLA Database. (No funds in FY 1983).

Need for Change. Organizing and announcing publications are major objectives of the bibliographic control program. These include cataloging books and journals newly acquired for the collection and indexing journal articles, conference proceedings, and reports selected for their importance to agricultural research and education. The Blue Ribbon Panel strongly recommends adoption of standards by NAL for bibliographic participation in national and international programs.

Nature of Change. Funding requested at this level includes cost of access to and use of cataloging and indexing data from a number of data base services now in existence, and permits the acceptance and modification of processing data on foreign materials from international data bases. It permits a major change to the present cataloging and indexing system which will produce maximum efficiencies in systems applications. Most of these functions will involve the use of contractors and other private sector organizations as recommended by the Panel. It permits upgrading of present technology which will over time permit transfer of information at greatly reduced costs. It will reduce duplication by using data on agricultural dissertations from an existing system rather than creating a new bibliography.

- (e) An increase for \$120,000 for center of excellence (\$70,000 available in FY 1983)

Need for Change. Resource sharing among agriculture libraries is essential to the development and implementation of a National agricultural information network as mandated by the Congress. The Blue Ribbon Panel recommends that NAL assume the leadership role in the development of such a network. This network will serve as a mechanism for establishing the essential and rapidly changing technology base on agriculture with minimal Federal investment.

Centers of excellence in new areas of agricultural research such as genetic engineering will be important components in the development of the National Agricultural Information Network. The Blue Ribbon Panel recommends additional resources be earmarked for the development of specialized centers or subject matter information at land-grant colleges. Present and new technologies permit transfer and sharing of information through the network at greatly-reduced costs.

Nature of Change. A pilot center of excellence will be established to provide information support for an important subject area such as genetic engineering at a land-grant institution which is already heavily involved in the field selected and is currently supported by an existing library collection. The land-grant agricultural library would collect and process information directly into the NAL data bases, eliminating the necessity for any other library in the network to duplicate this processing. Cost savings to USDA would be realized since NAL would have to expend more in building an excellent collection than to tap on an already existing collection.

The total cost for establishing such a center of excellence is \$120,000, of which \$25,000 is for collection building (books, journals, and other formats). That amount is to be matched by land grant institutions; i.e. the center supplies \$25,000 for added collection building.. The remaining \$95,000 is to be applied to indexing, reference and bibliographic service, electronic transfer of data to NAL databases and information dissemination to the network.

- (2) An increase of \$100,000 for repair and maintenance of facility. (\$200,000 available in FY 1983).

Need for Change. The National Agricultural Library building is a major asset of the department, estimated at a value of \$21,000,000. Few repairs have been made to the building since its completion in 1969. More extensive work is now required. The \$200,000 provided by Congress in FY 1983 for roof repair will be adequate to repair the most damaging roof problems. This additional increase request of \$100,000 will provide for an ongoing repair and maintenance program to correct known problems and prevent further deterioration.

Nature of Change. To prevent further deterioration \$300,000 will be applied to the most essential repairs. These include roof repair (in fiscal year 1983 major repairs will be made to the lower roof. In fiscal year 1984 repairs to the tower roof will be made), interior water-damaged ceiling repair, carpet replacement, rebuilding of retaining walls, paving walkway, lights replacement, and replacement of major heating and air conditioning equipment.

National Agricultural Library

Status of Program

The increasing application of electronic technology in modern information collection and dissemination played a major part in the programs of the National Agricultural Library (NAL) in 1982 as the Library marked its 20th anniversary as a national library and 120th year since its founding as part of the U.S. Department of Agriculture. New systems and equipment from satellites to computers were used to greatly increase the speed, efficiency, and effectiveness with which agricultural information will be transmitted into or out of the 1.7 million volume NAL collection with increasing emphasis given to user fees and related cost recovery. NAL is greatly reinforcing cooperation and contacts in these areas with other USDA agencies engaged in agricultural research, extension, forestry, and technical information.

Of equal importance was the completion of a study made by the Interagency Panel on the NAL commissioned by the Secretary of Agriculture. The panel made a number of recommendations designed to improve the Library's status as a central national information resource for agriculture and related sciences. The report proposed that an advisory committee be appointed from the library information and agricultural science communities to advise the Secretary of Agriculture on policy and that planning proceed immediately on a national agricultural information network.

Current Activities

A new automated Index-Catalogue system using upgraded computer technology and remote input terminals was developed in cooperation with Agricultural Research Service and began operating in November. NAL completed its first year of distributing its Agricultural Online Access (AGRICOLA) data base through the National Technical Information Service (NTIS). NTIS sells the AGRICOLA computer tapes to commercial vendors and institutions both in the United States and in foreign countries. Proceeds from tape sales were used by NAL for AGRICOLA access education and training programs.

Studies to transmit technical information over high-speed telecommunications with distant locations were successfully conducted. Computers were used to send data from Iowa to the NAL; literature searches done at Beltsville were received in Saudi Arabia via satellite. Both tests provided information essential to expansion of a nationwide network linking far-flung land-grant and other agricultural libraries and information centers with unique data collections and specialized audiences.

The NAL is participating in a major new initiative to provide agricultural information to rural Americans through the public library system. NAL cooperated with the Congressional Research Service to support expanded use of computers in disseminating agricultural information before a congressional committee. A new program has now been launched with the Extension Service to provide computer-based information to rural information centers to be set up and manned by county librarians and extension agents.

To strengthen communications and cooperative projects among agricultural agencies and institutions, the Interagency Panel recommended creation of a national electronic mail network linking an increasing number of State research and educational institutions with the Library and other USDA agencies including the Extension Service, Cooperative State Research Service, Economic Research Service and

the Forest Service. It is also assisting the Department in the establishment of an Information Technology Center where the latest computer technology will be demonstrated to agricultural managers working to modernize communications in the office and on the farm.

Selected Examples of Recent Progress

International Agriculture. NAL has arranged with the National Technical Information Service for U.S. distribution of the tapes produced by AGRIS, the international bibliographic data base of the United Nation's Food and Agriculture Organization (FAO). The library also is working with the National Library of Medicine (NLM) to include relevant AGRIS records in its TOXLINE data base. AGRIS may be available online in 1983 in the United States through commercial vendors. As the designated U.S. center for FAO activity, the NAL also sends monthly AGRICOLA tapes to Vienna, Austria for incorporation of U.S. records in the AGRIS data base. The international AGROVOC vocabulary is being reviewed and ways of putting it up for online access and maintenance are being studied.

Electronic Linkage. A pilot project for transmitting cataloging data in electronic form from remote sites into the NAL data base was worked out with Iowa State University, which is recording Extension publications issued in the North Central Region. A project to transmit data electronically to remote users, from Current Awareness Literature searches done at NAL, has been initiated. USDA supported scientists in Saudi Arabia no longer wait days for the mail to bring them printouts of their searches, but print them out in Saudi Arabia the day they are transmitted.

Satellites. NAL has demonstrated information transfer using communications satellites: a video-teleconference transmitted live from Denver, Colorado via satellite to the Beltsville library, and a comprehensive exhibit on aerospace remote sensing (AqRISTARS). In the satellite teleconference, the Library for the first time, became a receiving station for a special program on marketing information and library services sent from a meeting of the American Library Association in Denver.

NAL-ARS Index-Catalogue System. A cooperative agreement was signed between ARS and NAL to automate the Index-Catalogue system. ARS contributed \$40,000 to cover most of the costs for upgrading the Four-Phase mini-computer and installing remote input terminals. NAL did the systems design and programming. Input will begin in November 1982. The Index-Catalogue records will be included as part of AGRICOLA and also separately through NTIS.

Education and Training. The online training program continued to expand in its second year in response to increased demand from librarians, technical information specialists, and scientists. A total of 15 workshops were conducted in the Washington, D.C. area and six land-grant institutions across the country. Two hundred twenty-two persons from 32 states and three nations were instructed in the use of bibliographic and computerized research information systems. In addition to the basic and advanced level workshops, a third or introductory level was added with research scientists and technicians learning how to search the AGRICOLA data base, the Library's master bibliographic file. In cooperation with Extension Service and other public and private groups, further expansion of the program to include additional data bases and new audiences was explored pursuant to recommendations made in the recent report of the interagency panel on the NAL.

Aquaculture. The development of a national aquaculture information service received substantial assistance from the NAL working through an interdepartmental committee. In addition to a comprehensive bibliography, several directories--of ongoing research projects; key contacts; and information sources--are in preparation and will be published in FY 83. A comprehensive, concise overview on aquaculture was published in the Library's Agricultural Issues Series. A Smithsonian Institution exhibit on aquaculture was displayed during the year.

CPP Program. The cost to the Department of providing journal and periodical subscriptions to USDA scientists has been reduced significantly through the Consolidated Purchasing of Publications Program initiated by NAL 2 years ago. In addition to the savings, the program has resulted in improved services to scientists and a more efficient subscription system. Contracts for consolidated procurement of publications have so far been negotiated with four separate commercial publishing houses. The program has drawn favorable attention from the National Commission on Libraries and Information Science and the Office of Management and Budget.

Reference Guide. A major reference work, The Guide to Sources of Agricultural and Biological Research, was made available to scientists, librarians, and writers as the result of a 3-year project sponsored by the National Agricultural Library. A 735-page volume with 5,779 citations covering the last 25 years, the Guide is based on reference collections of numerous research libraries around the world. The new book also includes material on the use of online data base files. The work was issued by the University of California in cooperation with NAL. The International Directory of Animal Health and Disease Data Banks and Guidelines for the Preparation of Bibliographies were other significant publications.

Science Symposium. One-hundred thirty scientists, librarians, information specialists, and educators gathered from across the country for a symposium on Twentieth Century Agricultural Science in Washington, D.C. Sponsored by the NAL, the Agricultural History Society, and the Associates NAL, Inc., the symposium audience heard from administrators, historians, researchers, and communications and computer experts during this 3-day gathering. A "computer fair" featured data base demonstrations by Extension, Office of Governmental and Public Affairs, and other groups. The event was reported by television, magazines, and newsletters.

Self-Guided Tour for Visitors. A 20-minute self-guided walking tour of the public areas of the National Agricultural Library Building at Beltsville, Maryland is now being provided to visitors for the first time. The tape-recorded orientation describes the history, services, and operations of the Library for those who have an interest in or wish to use the facilities. More than 1,000 visitors from this country and abroad visited the Library in fiscal year 1982. Countries represented included the Peoples' Republic of China, the Netherlands, Germany, France, Great Britain, Brazil, Spain, and Canada. Land-grant university library directors, State extension specialists, college student groups, and librarians from the private industry were among those briefed on NAL resources and services and given tours of the facility.

